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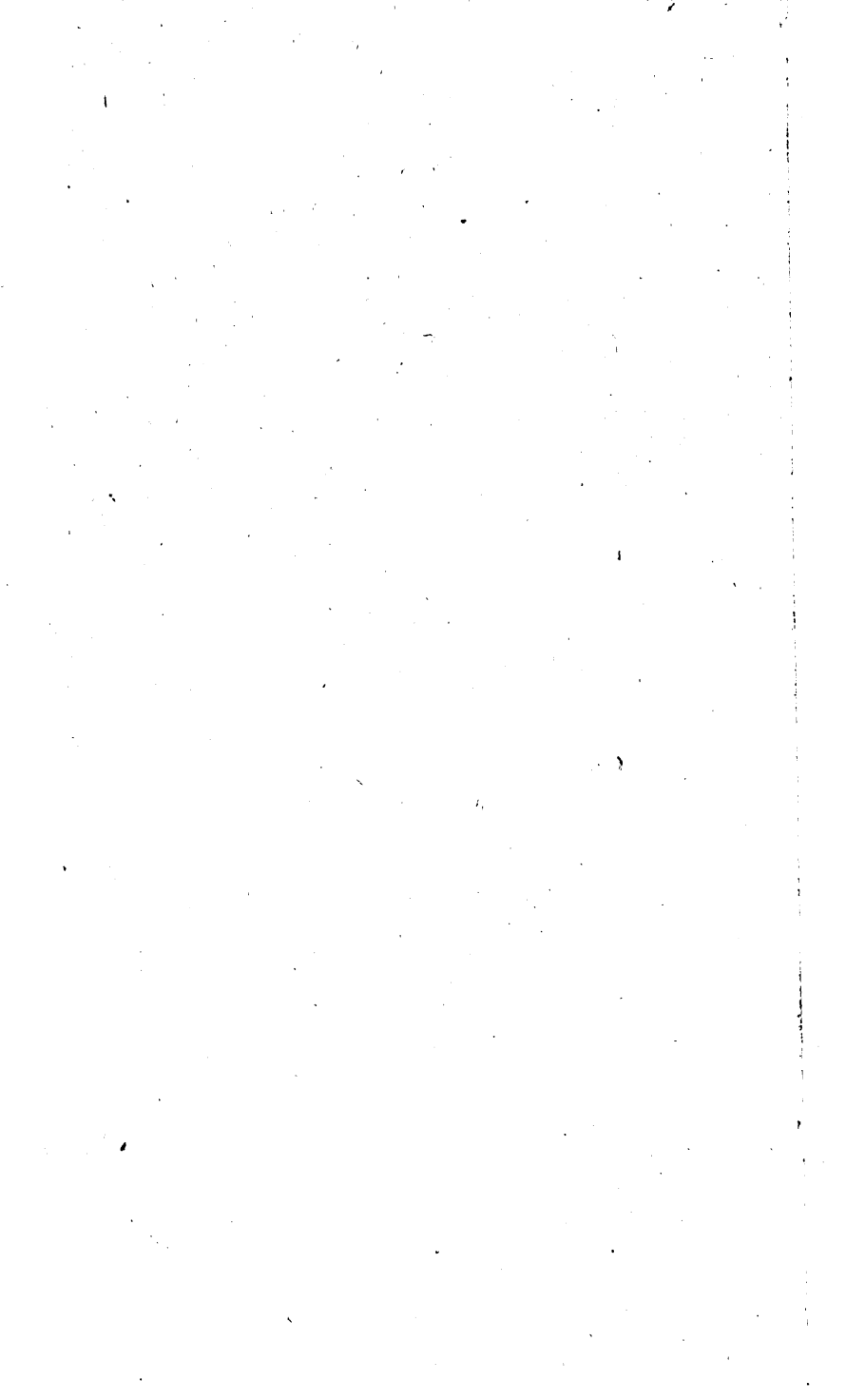


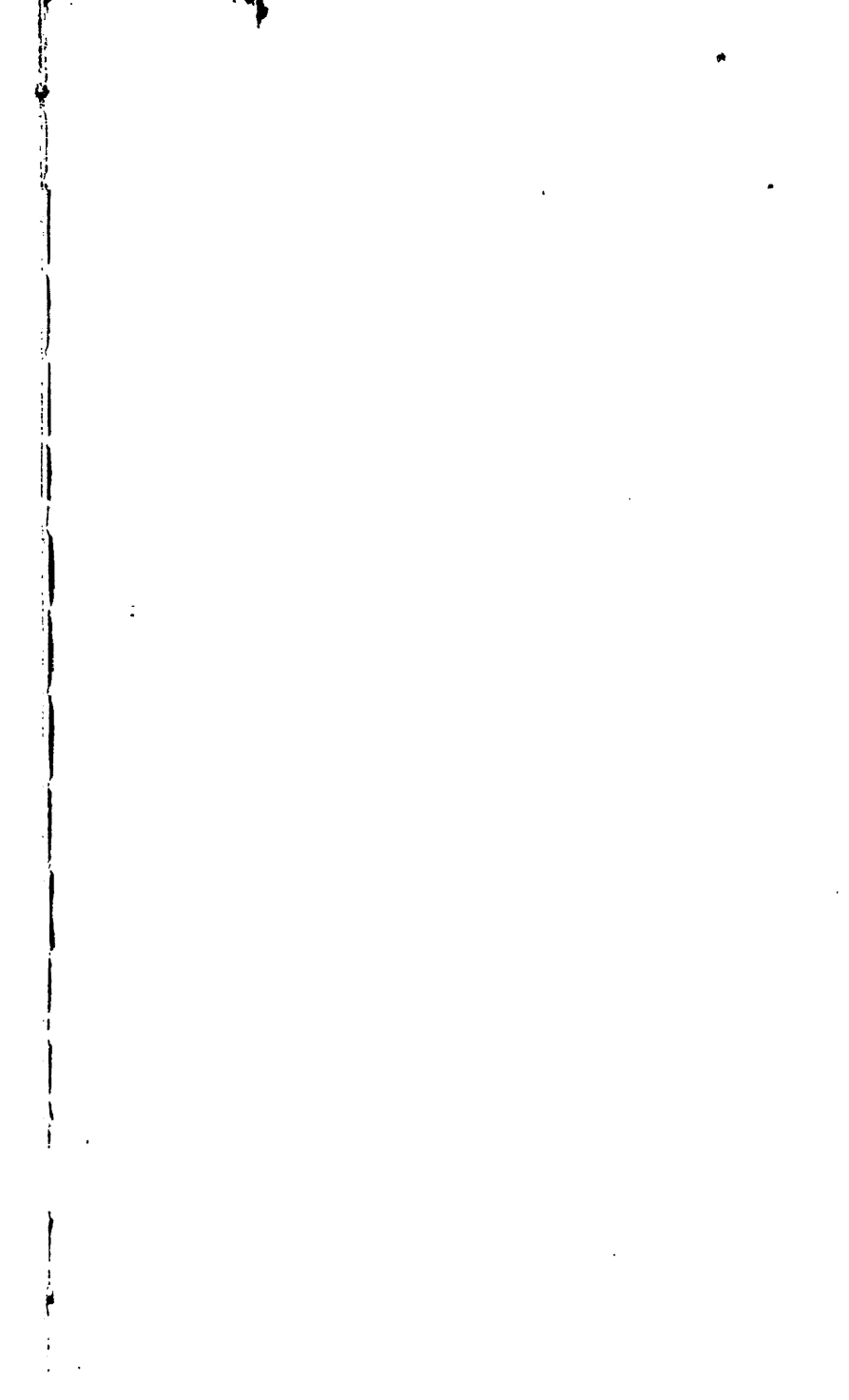
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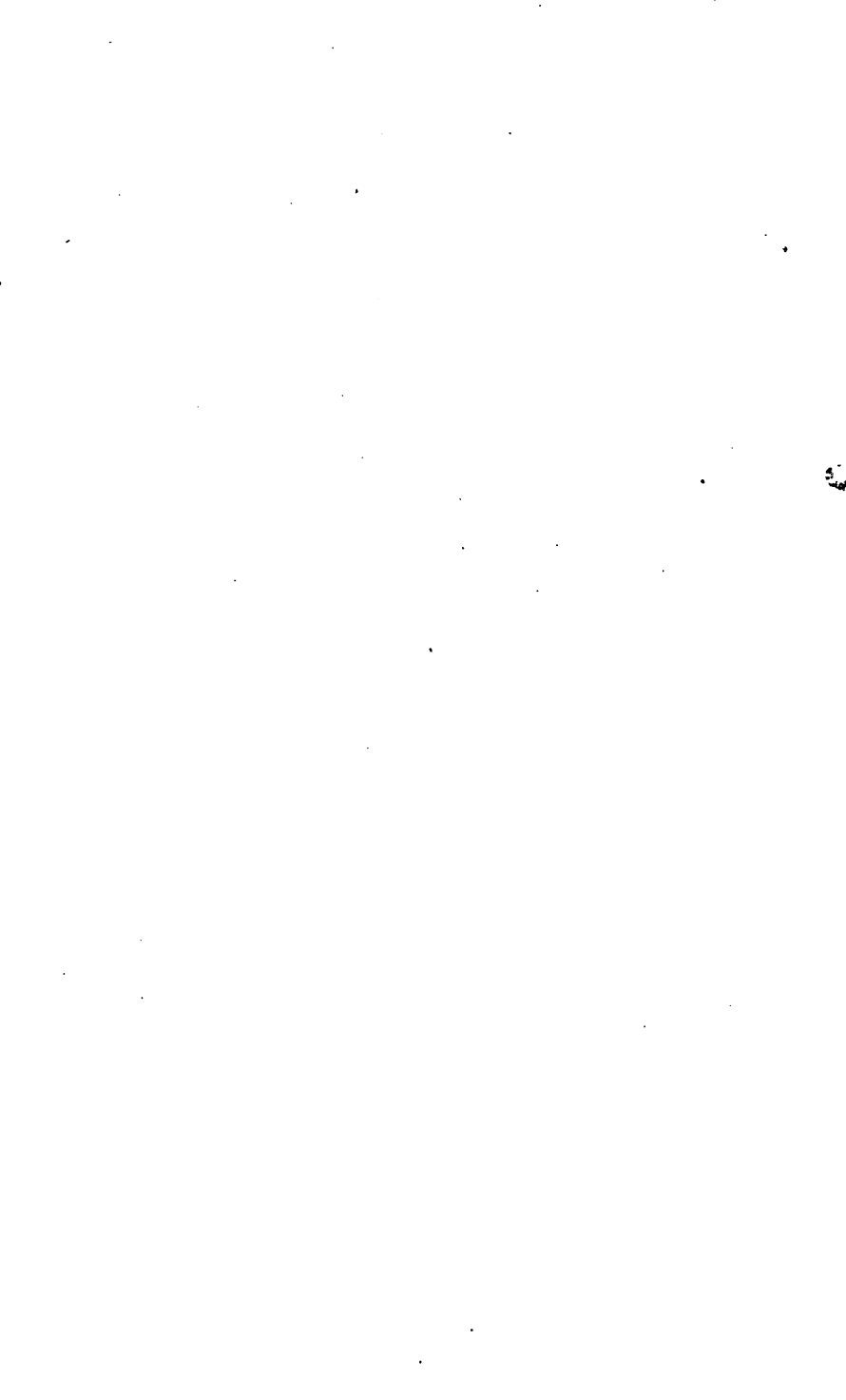


George Bancroft

Neale
YDD







THE
ANALOGY
OF
THOUGHT AND NATURE

INVESTIGATED BY
EDWARD VANSITTART NEALE, M.A.

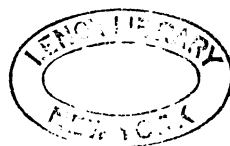
Let Knowledge grow from more to more,
But more of Reverence in us dwell;
That Mind and Soul according well,
May make one music as before.



WILLIAMS AND NORGATE,
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W. V. C. B.
1884
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P R E F A C E.

THE motto of modern science is "the correlation of forces;" in other words, the unity of the powers which affect our senses. The present investigation is an attempt to carry that conception one step further, by showing a unity between the power manifested in the phenomena of sense, and the power exercised in the operations of thought.

The method used in the investigation is, (1) to examine the process of thought in our own minds; (2) to follow its results through the great series of metaphysical systems evolved by the activity of Aryan thought, from the days of Thales to our own; (3) to compare this process with the results of the study of nature in their great outlines, as they are presented to us by modern science; and thus to establish the unity sought, as the most reasonable explanation of all the phenomena known to us.

It will be obvious that in this operation we must touch upon questions of morals and religion, as well upon those concerning logic or physics. But the connexion of these topics, though long eschewed by modern inquirers, is plainly forced upon us by the advance of physical research. To say nothing of geology, take Professor Tyndall's eloquent enumeration, in his "Lectures on Heat," of the effects of solar action; or Sir John Herschel's picture of the benevolence associated with gigantic power

in the operations of that luminary (Good Words, April, 1863); we are transported from the regions of pure physical research into that of morals and religion. Or, turn to Mr. Herbert Spencer's "First Principles;" we are involved in a profound metaphysical inquiry as to the point where science and religion meet.

Therefore we follow the general current of modern thought in allowing our logical or physical inquiries to be carried towards the regions of religion and morals. All that can be reasonably demanded is, (1) that we do not allow considerations drawn from human emotions to intrude into the questions belonging to the domain of logic or physics; (2) that we stop at the boundary where physical or logical investigations pass into the provinces of morals or religion, without allowing ourselves to be tempted into excursions in these fields. Within these limits the present investigation has been scrupulously confined. Its conclusions, therefore, claim to be judged solely by logical and physical evidence, without reference to their possible bearing on moral or religious controversies.

A work treating of a subject so extensive within the compass of the present work, must necessarily be condensed in its reasonings, and brief in its historical or scientific notices. The Author, however, hopes that his reasonings will be intelligible, and has taken all the care in his power to insure accuracy in the facts stated; and if he should fail in producing a *good* book, he has at least the consolation of thinking, that he has avoided the proverbial denunciation against the man who produces a *long* one.

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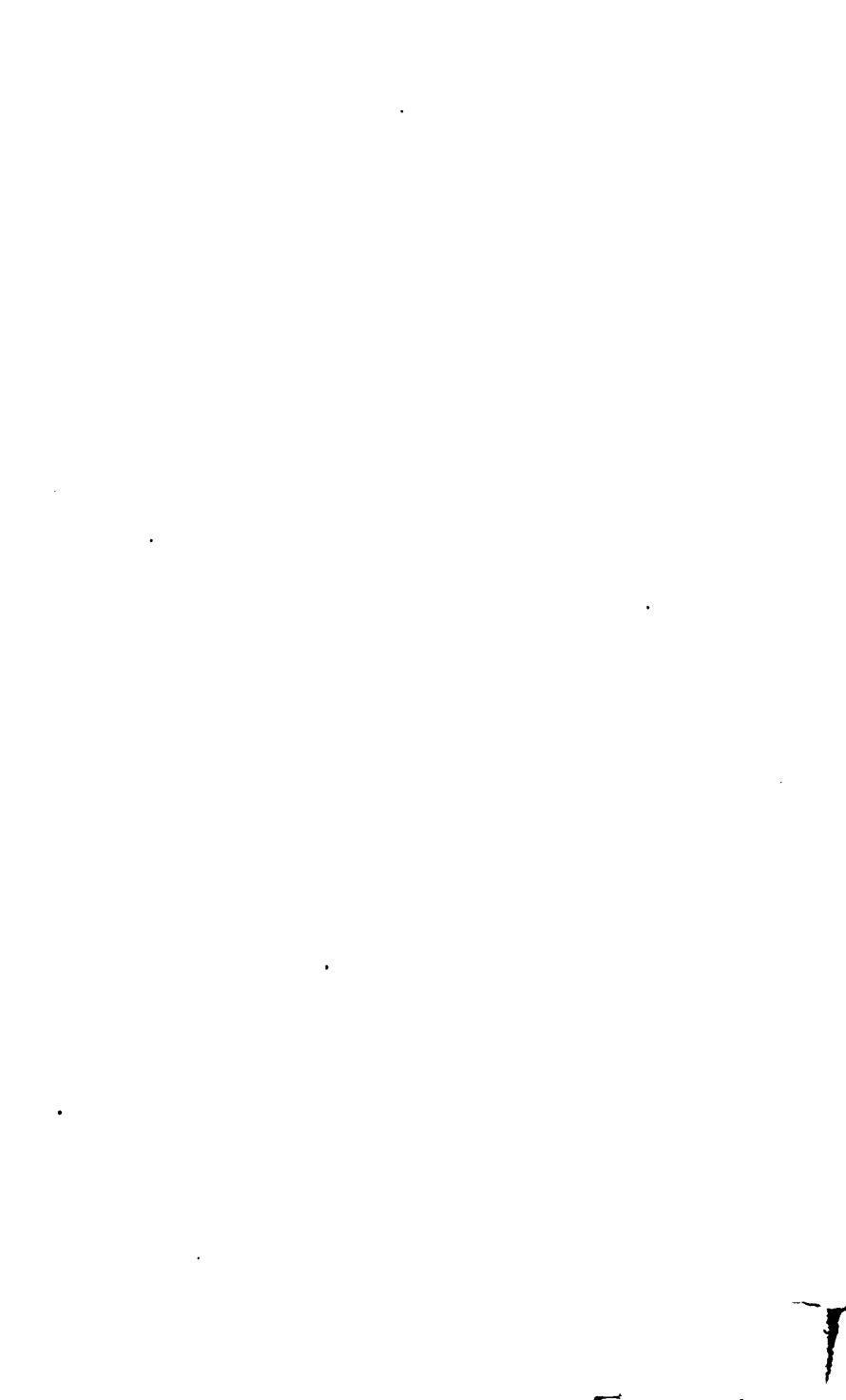
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PART I.

THE LAW OF THOUGHT.

*Eternal process moving on,
From state to state the spirit walks.*



CHAPTER I.

Introduction.

MONSIEUR COUSIN, in the brilliant introduction to his lectures on the philosophy of the eighteenth century, has traced the progress of thought through the successive phases of (1) Industry, resting on mathematical and physical studies; (2) Political Institutions, resting on the idea of Justice; (3) Art, resting on the sense of Beauty; (4) Religion resting on the thought of God conceived by Faith under the form of a symbol; (5) Philosophy, resting on the need felt by mankind to give an account to themselves of that which they adore; or, in other words, on the question "why?" "Le jour où un homme a réfléchi, ce jour-là la philosophie a été créée.¹ Doubtless, in this sketch, Monsieur Cousin desired to trace the logical order of thought, rather than its historical progress. For if he is right, as can scarcely be questioned, in his description of the birth of Philosophy, the day when Philosophy was born was the day when the first true man appeared on the earth, in the vigor of his powers. It is of the essence of humanity to ask "why?" as we may see by observing the opening of thought in any intelligent child. To ask "why?" is, in fact, the expression of the faculty which distinguishes man from animals; the sign that the seat of government is transferred from without to within; that the boat has a rudder, and is no

¹ First Lecture, p. 24.

longer to drift here and there as the wind or stream impels it. Now the question "why?" admits of very varied application. From it, or the kindred question "how?" do the applications of thought sketched by Monsieur Cousin naturally grow up. *How* am I to satisfy my physical wants? *Why* is the sun hotter and higher in the sky at one time of the day, or of the year, than at another? *How* am I to secure the tranquil enjoyment of the fruits of my labor? *Why* does one natural object please or strike me more than another? and *how* am I to arrange objects so as to produce these impressions? From the answers to these or similar questions, Industry, Science, Law, and Art arose. And from the question, *Why* am I here at all? *Why* do I feel and will? *Why* is there anything to be felt or to affect my will?—from such questions asked, instinctively if not consciously, arose, at a period lost in the hoary mist of antiquity, the thought of God, and the sentiment of religion. To establish the last position, it would be necessary carefully to examine the religious traditions of the different branches of mankind. Here we can only point out considerations indicating that man's nature would lead him to ask the question whence religion arises, at the beginning of his existence.¹ Man possesses a sense of will, of a power of choice: a being who did not possess this sense, might be the ancestor of mankind, but would not be what we mean by a man. Now when such a being began to observe the objects around him, the question must have pressed upon him, Have these objects a will, and power of choice as I have? They are not fixed and changeless: the clouds move; the winds blow and subside; the trees bud forth and shed their leaves; the stream swells and falls; the lights in the sky do not stand still, nor yet always move alike. Do these beings "*will* to do what

¹ By which we do not mean that of the first two-legged being who possessed a *hippopotamus minor*. (See Professor Kingsley in Macmillan's Magazine for November, 1862.)

they do ;” or, if not, is there any Being whose will they obey ? Thus was man prepared by the instinct of his own action for that conception of the presence of a Divine power, a Being in nature capable of willing like himself, which, if we interpret the traditions of old time aright, lurks beneath the “Let us make man in our own image” of the first chapter of Genesis. The exercise of thought by man, immediately led him to the thought of God.¹

The first philosophy, therefore, was inseparably intertwined with religion. How, then, came philosophy and religion to be distinguished ? We apprehend through an operation analogous to that birth of philosophy imagined by Monsieur Cousin ; an operation to which all progress in knowledge is due, namely, through men having asked, as Leibnitz charged Queen Caroline with asking, *le pourquoi de pourquoi* ; and through the opposition to such questions. For beneath the impulse urging man to ask “why,” (*i.e.* the search after truth), lies hid an opposite tendency, without which the search would never be prosecuted ; the disposition to hold fast what is supposed to be true ; to adhere to the original “therefore,” called forth by the primitive “why,” and require other men to do the same. We may see this disposition at work every day. So long as men have no theory about any particular phenomena noticed by them, they are usually glad to be furnished with one ; and thus to satisfy the inborn desire to ask “why.” But give them a theory ; let them have become familiar with their “wherefore ;” and they do not like to be disturbed. It is so unsatisfactory to be set adrift again, when we fancied ourselves securely anchored. Therefore,

¹ We will not contest with Monsieur Cousin, that this thought was pregnant with fetichism. Doubtless, at first, everything must have been divine to man, as the expression of a will like his own will. But the conception was also pregnant with a feeling of oneness in this all-forming will. Not till men became accustomed to distinguish the wills of natural objects among themselves, would fetichistic worship arise.

all systems of Industry, Science, Law, Art, Religion, resist the impertinent fellows who would strip their "wherefores" of the trappings of authoritative custom, and make them run the gauntlet of fresh "why's." But the original impulse will not be stayed. In every sphere of thought, where thought is not stagnant, it is continually born anew. And thus Philosophy arose, as a special exercise of thought, when men began to question the "wherefores" of their religious "why's;" i.e., to ask whether the solutions given by Religion of the great problems of humanity were true, and, if not, what was the true solution?

But although Philosophy thus sprang from the critical faculty of thought, she must not be supposed to have been exempt from the general tendency of mankind, to set up the attainments of the past, as a fetter on the present. On the contrary, systems of philosophy have repeatedly become to their followers as authoritative as the religions to which they have been opposed: while religions, as is well known, have been subject both to slow modification from internal development and to abrupt changes. The great point in which Philosophy has differed from Religion is, in admitting a solution of the problem common to both, inadmissible to her venerable parent.

The solutions of Religion have always ascribed, in some form or other, a personality to the power manifested in the phenomena of the universe. They have rested upon the instinctive faith that this power resembles human power.¹ Philosophy has admitted the question whether, beside human intelligence and consciousness, there is any intelligent and conscious Being whose action is manifested in the world; or whether its phenomena do not arise from some other sort of action, and what? This question still forms the pivot of philosophical inquiry; and those who

¹ Buddhism is not an exception to this statement. For its *Karma*, or moral cause of the world, is practically personal; and the will by which it is displayed is avowedly declared by persons, namely, the different Buddhas.

are acquainted with the tendency of modern metaphysical speculation, must allow that it pre-eminently demands investigation from all who are not willing to leave a chasm unbridged between their religious feeling and their philosophical thought. If, as the majority of Christians believe, God, the author of nature and of reason, has manifested himself to man, as a personal Being, by means addressed to the reason of man, it is inconceivable that this reason should be led by the careful study of itself and of nature to deny the personality of their author. Yet it cannot be denied, that the current of metaphysical thought has set strongly, in modern times, in this direction. That three-fold proof of the Divine personality advanced by the thinkers who preceded Kant, shrivelled up under his withering criticism. God, it had been argued, must be a personal Being; (1) because we must conceive Him to be the most perfect Being, and of this perfection personal consciousness is one element;¹ (2) because we must conceive Him to be the final cause of all existence, and this cause must be conceived to be a conscious will; (3) because the world is full of marks of order and design, and these imply conscious intelligence in the Being through whose action they are produced. Kant showed that the apparent conclusiveness of these proofs arises either from the tacit assumption that what *we* conceive to be necessary must be such as we conceive it,—an assumption which no one ventures to make directly; or from the application of principles, true of our own action, to the Divine action, which is essentially different from ours.

The last objection applies to the third proof: the favorite with English writers on Natural Theology. The force of that proof lies in the inferences drawn from our own experience. We know that the order and adaptation displayed

¹ This argument is sometimes stated in the form: God, meaning a conscious Divine will, must exist, because He is the most perfect Being; and existence is a perfection. The principle of the argument is the same.

in our own works implies a conscious intelligence of the qualities belonging to the materials which we arrange. The sense of our own personality is bound up with the distinction of ourselves from these instruments of our will; and we infer that the Divine Being must possess conscious personal intelligence, since its action in the universe manifests a principle of order and adaptation. But those who make this inference do not observe that the designing intelligence displayed in human action is shown in dealing with materials whose qualities are independent of our will. For instance, we fix a peg into a wall to hang up our coats, because, without some contrivance of this sort, the pull of the earth would bring them to the ground. The act manifests a *design* to modify the effects of this pull, which we cannot arrest; and a *knowledge* of the relative strength of the pull and the material employed to resist it, through which our design is accomplished. But suppose both the pull of the earth and the strength of the peg were to result directly from our will, where would be the *design* shown in the use of the peg? It would pass into a caprice,—a play of our will with itself; a fancy to do by an intervening machinery what might equally well be done without its intervention. Obviously, therefore, if we are to infer personal intelligence in the Deity from the appearances of design in the universe, we must hold the Divine will to be limited by the nature of the materials employed by it. We cannot logically infer what we want to prove, namely, the existence of an unlimited, creative, intelligent will.

In this state of the argument there has appeared among the writers who seek to uphold the belief in the personality of God, a tendency to take refuge from thought in feeling; and to contend that we are justified in assuming the existence of an intelligent loving Will, the source of all Being, because our moral faculties require the support of such a belief. But to give solidity to this reasoning, it must be

shown that the facts of human history furnish the external evidence required, to convert it from a vague sentiment into a scientific conception. Viewed apart from these facts as an independent foundation for the belief rested upon it, the argument is open to the fatal objection that the instincts of humanity are not agreed in the religious belief which they demand. Mr. Ward, for example,¹ deduces from the wants of his religious feeling an army of saints and angels surrounding man on the earth. The religious instincts of his evangelical neighbour denounce them as derogatory to his sense of the Divine presence. Which instinct is right? and to what test shall we appeal to decide between the conflicting pretensions? We are driven back upon that labyrinth of perplexed inference, whence the so-called Positive Philosophy endeavours to escape by the proposition that man can know nothing of the ultimate cause of phenomena, and must content himself with investigating their laws.

It may appear presumptuous in the present writer to suppose that he can indicate a satisfactory road out of the maze, whence so many of the profoundest thinkers have discerned no issue. But it is a consequence of the law of human progress, that what overpowers one generation appears easy to the next, who stand upon the shoulders of their predecessors. Since the time of Kant the field of metaphysics has been dug over by a succession of men, distinguished by the boldness of their speculations and by their logical consistency: and although, from a cause to be subsequently noticed, their systems did not lead to satisfactory results in their own hands, they have led to a position whence such a result appears attainable. The variations of human speculations concern our thoughts, but not our power of thinking. Under every modification of its effects, the mode of operation of this faculty appears

¹ In his *Ideal of the Christian Church*.

to be the same ; that is to say, there is a law of thought, a law brought to light by Hegel ; and by means of this law it seems possible to penetrate into the mysteries of existence, to an extent quite impracticable without its aid.

For if there be a law of thought, and the character of that law is detected, so that we can discover what the form of objects produced by a power acting in conformity with this law ought to be, it follows that where we perceive this form of action, we may be entitled to reason back to the intelligent nature of the power displayed in it. So that from our own faculty of thought and the properties involved in its exercise, we may be legitimately entitled to infer the character of the power whose action we perceive in the universe.

It is the object of the present investigation to follow the clue here indicated : (1) by examining the law of thought with the aid of the researches referred to above, and especially that of the celebrated dialectics of Hegel ; (2) by applying this law to illustrate the conclusions to which scientific inquiry has led modern thought, as to the character of the forces constituting what we call Nature.

By this process we believe it possible to cast no dubious light upon the true character of that ever present power, whose action in the universe forms the subject of scientific research.

If such a result is attained it will clearly be an effectual answer to that school of philosophy noticed above, which has recently gained great influence, and maintains that man must remain satisfied to state the laws of Nature without inquiring how such laws can be conceived to exist, because he never can form the conception. We shall have occasion to refer again in the course of the present inquiry to this opinion : here we content ourselves with expressing the hope that we may be able to disprove it by the same

kind of process by which the Great Western disproved the assertion that steamers could not cross the Atlantic, namely, *by steaming across*.¹

¹ To obviate the misconception that the subsequent argument is only a reproduction of Hegel's logic, it is proper to state here that, though suggested by that profound research into the nature of thought, the course of reasoning is quite independent of that of Hegel, and in many very important points leads to conclusions materially different from those arrived at by him.

CHAPTER II.

The Characteristics of Thought.

THE course of reasoning indicated in the last chapter naturally commences by an inquiry into the general character of the operations carried on in our intellects. For if, as has been suggested, there be a law of thought, we shall thus probably be put upon the road to its discovery.

If we examine the process of thought in our own minds, we may detect in it a twofold operation: the *first*, constructive, by which we present to ourselves objects of thought composed of different parts; the *second*, analytical, by which we dissect these objects, or their parts, and contemplate the results of our dissection in their mutual relations, for the purpose of tracing out the bond or principle of union existing among them. This description applies to all thought, whatever the number of objects comprised in its operations: for to compare any objects we must first bring them together in thought, and thus construct a new unity out of them. It applies alike to the profoundest and the most instinctive exercises of thought. To test the truth of this statement we will begin with the latter, with the thoughts concerned in the perception of natural objects.

Let us imagine that we see a mass of green or dark blue tints, of various shades of intensity, partly limiting each other, partly limited by bright blues or reds or some other color, and forming what we call a landscape. To give to this perception an intelligible shape, we must dissect the mass of colors, and arrange them in thought. Some we throw together, and refer to a common principle of

connexion. Others we reject from this bond, and refer to another principle, and say, suppose, "I see a tree standing out against the sky, or against a grassy hill, or against some other background," as the case may be.

Now it is true that in this operation we are copying nature, and precisely that circumstance makes the whole operation so easy. We do, or try to do, what she has done already. If we combine certain colors into what we call a tree, this is because they appear to us to belong to substances visibly standing to each other in a closer relation than to the objects around them, such as the grass, rocks, or sky, excluded by us from this thought. But although we follow the guidance of nature in this species of constructive act, we are not passive recipients of her action, but, by our own activity, put the impressions she makes on us together.

It is a familiar observation that, in order really to perceive any objects we must *attend* to them. If our thoughts are occupied with other matters, the most striking natural phenomena may be present to our senses, while we are not conscious of their presence. Reid has illustrated this mental peculiarity by the case of two persons engaged in an earnest conversation, who were quite unaware of the striking of a clock. And the school of psychologists have founded on similar observations a whole fabric of arguments, more curious than useful so far as regards the comprehension of the process of thought, on latent modifications of the mind. The position now under consideration is confirmed by our dissatisfaction in looking at any *confused* mass of objects, that is to say, any mass which we do not see how to arrange into definitely related parts; unless this confusion becomes an element in the higher thought of richness. It is confirmed further by the physiological fact that, from the construction of our eyes, we cannot see clearly more than a very small portion of any considerable object at the same time; whence in looking at such objects

carefully we must move our eyes successively over their parts, and thus, by the very act of vision, construct the object in thought.

But the truth of the proposition that thought is essentially a process of construction is most forcibly shewn in regard, not only to the results of sight, but to the whole series of thoughts connected with the objects of sensation, by the relation between thought and speech. It is impossible to think distinctly without embodying our thoughts in some symbolic representation, expressed or conceived; that is to say, we cannot think without bringing together in our minds a thought and its symbol, and constructing a unity out of them. *Thought is an equation, of which the sense forms one side and the symbol the other.* Until we complete the equation by bringing the two sides together, our thought remains in the germ, a mere capacity of thinking without any completed product. Nor are we satisfied even with these symbolic constructions till we have given names to our symbols; which indeed, as is well known, originally grew out of the names attached to the different objects thought of. Now in the act of speaking we not only deal with the constructions of thought, but *form them*. In pronouncing the name of a friend, for instance, we bring together in rapid union all that we can recollect about this friend. The name *bolts together* these combined recollections into a distinct object of thought, and thus helps to fix them in our memories, while it enables us to think about our friend.

That necessity for attention, noticed above, in order to prevent the impressions made upon our senses from flowing away unnoticed, is an immediate consequence of the constructive action of thought exercised through language. We must concentrate our energies upon the point to which the word used directs them.

Hence arises the psychological fact that the more we attend to any object as a whole, the less we attend to its

parts; and the more we think of the characters of any objects, the less we can think of the number of those objects, and the converse. *Our attention is confined to what is essential to the purpose we aim at*, that is, to the point where we effect a union between the materials brought together by means of the words employed.¹ However numerous the objects presented to us by the faculty of sense, as, for example, the grains in a heap of sand, we select from the multitude what we want for the construction in hand, be it a single object, or quality, or the union or difference of many objects or qualities, and take no *note* of the rest. We can no more build two things at one time with our minds than with our hands.

The operation traced here goes on in a more profound form when a name represents to us the thought, not of an individual thing, but of a thing "after its kind." But is not this, it will probably be urged, quite a different mental operation from the act of construction? Do we not *abstract* from the thing observed certain characteristics, and apply these as signs, so as to recognise other things possessing similar characteristics?

The question deserves the most careful consideration. Undoubtedly in contemplating any object we fix our minds successively on its component parts, and in so doing abstract or draw them off from the other parts. But to refer to this operation of thought the formation of the conception of things "after their kinds," is to substitute the quarry man for the architect. To abstract is merely, to

¹ See the Rev. W. G. Davies' work on the A.B.C. of Thought (London, 1861, p. 64) where the laws of attention noticed by modern psychologists are clearly stated, but, *more psychologorum*, without being accounted for. When we store up our work in language, we may combine as many acts of thought as we please in a single proposition, as in the sentence, "It is a hard, round ball, striped green and red." But each part of this proposition is obtained by a distinct mental operation in which we first construct the conception of a ball, and then connect it with the independently constructed conception of hardness, roundness, etc., through the medium of the sounds constituting those words.

pull away. It is such an operation as Jack Horner, of nursery celebrity, performed on his Christmas pie, when—

“He put in his thumb
And pulled out a plum,
And said, What a good boy am I.”

We may copy his example. We may “abstract” the petals from a rose, for instance, and shall have the petals without the calyx or stamens, or the latter without the former. Or we may “abstract” the coats of an onion one by one, disclosing always a fresh coat behind till all are gone; but the process, whether performed physically or mentally only, would not enable us to class any other object as a rose or an onion, unless we join it with a very different one. What do we “abstract,” say from an oak, when we want to think of it as a kind of tree, and to recognise other specimens of the same kind from the study of the particular specimen before us? Do we exclude from our consideration any part of the tree—boughs, stem, bark, leaves, flowers, fruit, roots, if we can see them? On the contrary, we want them all, and try to remember them all. But do we use these phenomena, or any one of them, as they impress our eyes with their individual peculiarities? On the contrary, if we did this we should entirely defeat our object. If we could carry in our memories a photograph of any particular oak, and were to apply this picture, or any part of it, to any other tree, in order to ascertain whether it was an oak or not, assuredly we should never find another tree to which it would fit, and must conclude that there was but one oak on the earth.

Yet many of the clearest headed thinkers maintain that, in forming general terms, we do go through an operation at least very like this last. Listen to Dr. Whately, for instance:—“When we draw off and contemplate separately any part of an object presented to the mind, disregarding the rest of it, we are said to abstract that part. Thus a person might, when a rose was before his eyes or mind,

make the scent a distinct object of attention, laying aside all thought of the color, form, etc.; and this, even if it were the only rose ever met with. He would be employing the faculty of abstraction. But if, in contemplating several objects, and finding that they agree in certain points, we abstract the circumstances of agreement, rejecting the differences, and give to each of these a name applicable to them in respect of their agreement, a common name, we are then said to generalize." Hence the Archbishop infers that a "common name is merely an inadequate or incomplete notion of an individual, which, from the very circumstance of its inadequacy, will apply equally well to any one of these individuals;—e.g. "If I omit the mention and the consideration of every circumstance which distinguishes Etna from any other mountain, I then," says Dr. Whately, "form a notion expressed by the common term mountain, which inadequately designates Etna (that is, which does not apply to any one of its peculiarities), and is equally applicable to any one of several other individuals."¹

Now, *pace tanti viri*, we would ask of which peculiarity of Etna would Dr. Whately "omit all consideration" in forming his common notion of a mountain from it? Not its height, for all mountains are high; nor its rugged sides, for all mountains have their vallies and their buttresses; nor its woody base; nor its snowy summit; nor even its volcanic flames: for many other mountains possess similar peculiarities; and the fact that Etna does possess them, proves them to be mountain possibilities. That the idea of a mountain would become "inadequate," in proportion to the peculiarities whose consideration was omitted, we fully allow. If all were left out, the idea would be destitute of any contents, and the common term mountain "abstracted" from Etna would mean nothing at all: but

¹ Logic, ch. 4, sec. 6, p. 50. So Mr. Mansel defines general or common terms to be "the inadequate representation of individuals." Metaph. 38.

we presume Dr. Whately would not be better satisfied with it for that. It is indeed true that "common" or "general" terms do ordinarily convey vague and imperfect thoughts about their subject-matter. Much is included in the thoughts which they do not express. But it is not the office of such terms to produce vague and imperfect thoughts. Science is ever toiling to attain more comprehensive common terms: will it therefore be contended that the aim of science is to present conceptions of individuals perpetually growing less perfect? The case is quite the reverse. Take the account given by that eminent practical naturalist, Mons. Flourens, of the preparation required for the proper description of a species:—"Il faut observer l'animal vivant. Il faut l'observer pendant longtemps. Il faut le voir se développer et se reproduire. Il faut en étudier le *naturel*, les *instincts*, l'*intelligence*, chacun de ces choses a dans chaque animal un caractère propre; et c'est par l'ensemble de ces caractères que se définit l'espèce."¹

This is a very different conception from the "inadequate representations" of Dr. Whately or Mr. Mansel. But it is not difficult to point out the source of their errors. They have confused the thoughts *expressed* by the general term, with the thoughts *implied* in or *called up* by it. The result of all the labors described by Mons. Flourens might probably be the discovery of one or two striking characters, peculiar to the animal under examination; and, if such were the case, the naturalist might properly confine his definition to those characters, because they would be the marks most useful for insuring the recognition of the creature in question by persons not acquainted with it. But the thought called up by that definition to the man who made it, would be the animal itself, with the many varieties by which different animals of the same species are distinguished.

¹ Flourens, De l'instinct des Animaux, 202, 4th ed.

When the zoologist distinguishes a horse from the allied species of ass, zebra, or quagga, by its being the only vertebrate, solid hoofed, mammifer, with a pendulous mane, a tail with long hairs extending to the root, and callosities on the forearm and hind canons, we cannot suppose this to be all that he thinks of. Nor in the larger groups of his classifications, in the conception of the solid hoofed, the vertebrate, the mammal, where the peculiarities of the individual necessarily disappear, is the process of forming the definition one of abstraction. The thought of a vertebrate animal might indeed seem, at first, to be only that of a creature with a backbone. But consider what a backbone means. It is the canal for the spinal marrow; implying a head whence that marrow proceeds, a nervous system put into communication through that canal with various parts of a fleshy body, to produce the functions of motion, of sensation, of digestion, of respiration, of reproduction, each exercised by organs suitable for the purpose. These thoughts are all implied, to the modern naturalist, in the conception of a creature with a backbone. Then consider the infinity of *possibilities* connected with each of these parts. To any one familiar with natural history, the thought of the backbone is the link by which millions of thoughts are bound together into a living whole. To call this an "abstraction" is an absurdity.¹

¹ The source of this error may be traced to the circumstance, that those who have theorized about the origin of general terms, have rarely been persons who had formed such terms. Dealing with the words selected by other persons to sum up the results of their observations, they have perceived the bareness of the thoughts expressed, without feeling the fulness of those implied. Hence Mr. J. S. Mill notices, as a defect of the study of the natural sciences, "that they accustom the mind to consider, in objects, chiefly the properties on account of which we refer them to classes, and give them general names, but leave our conceptions of them as individuals vague and meagre (Dissertations, I. 104),—an effect certainly not produced on those who study from nature. Dr. Buckland used to warn his geological class against such a danger, by cautioning them not to think themselves geologists till they were sure that they could 'tell granite from green cheese.'"

To express the suggestive character of general terms noticed here, recent writers on logic have invented the phrase of "connotation" (See Davies'

Perhaps no science has fostered the notion that scientific thought proceeds from a process of abstraction more than that of botany. Its growth in the last century was greatly due to the impulse given to it by the labors of Linnæus; and on what, it may be urged, is his classification founded, but on observing the numbers and arrangement of the stamens and pistils; i.e., on one part of a plant "abstracted" from the rest. But in truth this instance supports the present argument rather than opposes it. Why did Linnæus select the organs of fructification for the basis of his system of classification? Avowedly as a preliminary process; to clear the way; to obtain some intelligible principle of arrangement, where all, beyond the first step, seemed a maze of confusion. No one was better aware than himself that his system was quite artificial, often bringing together plants naturally distinct, and keeping apart plants naturally united. His dictum, quoted by Mr. Darwin, that "the characters do not make the genus, but the genus gives the characters," shows how deeply he felt that the study of special characters is the investigation of principles of construction whence these characters are educed; that, as Mr. Darwin himself says, "the distinctions of species depend upon an aggregate of characteristics, often too slight to be defined, and yet when taken altogether, constituting differences capable of appreciation."¹ But the knowledge of the vegetable kingdom, in the age of Linnæus, appeared to the illustrious Swede too imperfect to allow of the construction of a truly natural system of plants. Therefore, in this respect, he confined himself to producing what he termed "Fragments of a Philosophy of Botany," and applied his great powers of

A.B.C. of Thought, p. 49). We have no objection to this name as a statement of the character of language, but it is fatal to the notion that names originated from a process of abstraction. The enormous amount of mental work hidden in words is the great cause of the mistakes prevalent as to the character of thought.

¹ Origin of Species, 413, 417.

observation to pick out some well defined characters by which to construct a botanical dictionary; where a division might be found for every plant, labelled with a letter of Nature's marking, easy to be read, and therefore making the stores of accumulating knowledge easily accessible when they were wanted; a work which, however arbitrary its arrangement, was, when it appeared, an eminently constructive act of original thought, giving unity to a vast mass of very precise, minute, and widely extended investigation.

Thus, then, the first operation of thought applied to the observation of nature, is to construct combinations of its own from the materials supplied to it by the senses. But it does not stop here. It goes on to criticise the unities it has constructed. It takes them to pieces; examines and re-examines their constituent parts, to see whether all and each are properly embraced by the assumed bond of union; or whether the latter may not require modification in this or that particular, in order that it may comprehend or shut out, all that it was intended to take in or exclude. Here it is that the process of "abstraction" comes in; and because it thus forces itself on men's notice, they have fallen into the mistake of attributing to it the formation of the unities it criticises. Of this critical process almost every science during the last 150 years has afforded an example.

Diruit, edificat, mutat quadrata rotundis,¹ is the summing up of scientific history. But its changes of conception are due, not to arbitrary caprice, but to the untiring love of truth in the investigators, who have striven to trace the links of thought beneath the endless richness of nature. To find in all these efforts nothing but plans for tying up little bundles of arbitrarily selected facts, in order to put them away in the pigeon-holes of memory, would be to give a very distorted picture of the objects of scientific

¹ He builds, destroys, and changes square for round.

observers. On the contrary, the history of science is the history of a perpetual effort to discover conceptions by which the relations between the observed facts may be truly expressed; so that, when the process is complete, the phenomena resulting from these relations may be deduced from their definition, as the motions of the planets can be deduced from the law of gravitation, if their respective masses, distances, and rates of movement are ascertained. And this effort has been carried on by the constant repetition, of the same process which may be seen at work when thought deals with a subject-matter supplied entirely by itself.

The mathematician places before his mind, we will suppose, a figure formed of three straight lines enclosing a space. He seeks to ascertain the mutual relations of these lines, and of the angles formed by their intersections. To do this, he would begin by resolving the three-sided figure into its component parts, and varying his suppositions about their possible relations. He would conceive his figure with three equal sides; with two equal sides; with three equal angles; with two equal angles; with one right angle, etc. He would draw lines in such directions as enabled him to illustrate his suppositions. If his perception of such relations were clear, he would reproduce the demonstration of them to be found in the first book of Euclid; passing from the simpler to the more complicated, after the example of his illustrious predecessor.¹ Now, undoubtedly, all these relations are involved in the original conception of a triangle. What we call their demonstration is only the perception of this fact. The necessity for the process arises from the freedom of thought, which allows us to imagine that other relations may subsist between the parts of our original conception than those really subsisting. Therefore, before our conclusions become certain, we

¹ See, however, note to chapter viii., on the defects of Euclid's method.

must carefully dissect our conception, in order to satisfy ourselves what are the relations implied by it. But this necessity does not change the nature of the proof. That the three angles of a triangle are equal to two right angles is as much involved in the conception of a triangle, as the impossibility of enclosing a space is involved in the conception of a straight line; only we cannot see this in the one case as we do in the other, because, while the thought of a straight line is perfectly simple, that of a triangle is complicated.

The fact that in mathematical problems we are occupied with the examination of conditions implied in a previous operation of constructive thought, is still more evident in mathematical reasoning carried on by means of symbols, than in geometrical reasoning. For here we express by our symbols the living thoughts by which the relations of the several parts are determined. A circle, for instance, is defined algebraically to be the figure resulting from the movement of a point round another point, under certain given conditions. The same conditions are implied in the geometrical definition; but there the circle is thought of as complete. In the algebraical process it is caught in a *nascent* state, and appears as the result of its own qualities.¹

¹ This consideration must qualify that preference for geometrical over analytical processes as an instrument of education, expressed by Sir William Hamilton and the writers cited by him (*Discussions*, 305). When we deal with problems like those of the conic sections, the analytical process, if clearly explained, gives a much more living conception of the relations of the figures than the geometrical. A boy who is shewn the outline traced by the movement of a pencil, pressing against a string loosely tied round two pins, and the effect of bringing them together or placing them further apart, will gain a far more distinct conception of the relation of an ellipse to a circle in five minutes, than he is likely to gain in five months by laboriously toiling through the geometrical proofs of these relations. The value of geometrical reasoning, as a means of awakening the intellect to see the nature and cogency of strict proof, those familiar with its demonstrations generally admit. But this benefit is attainable from the study of Euclid. It is useless to extend the same kind of proof to problems whence the pupil can gain little beyond admiration for the sagacity of those who discovered the method of proving them; and which afford far less facilities for the exercise of original thought by him, than the opposite process affords.

Thus we see that the operations of thought are essentially constructive in its application to the two opposite subjects of the observation of nature and the study of mathematics. It follows that they must preserve the same character in the proper scientific process of applying mathematical conceptions to explain natural phenomena. The ellipse by which Kepler discovered that he could represent the path of Mars, was not less the product of his own thought, because it proved to be an approximate representation of phenomena in the skies. And when Newton demonstrated that a moving body, continually urged towards a fixed point, by a force varying inversely as the square of the distance from that point, must describe one of the conic sections round it as a focus, his thought could not lose its character as thought, because it explained the action of the power by which the movements of the planets round the sun are regulated.

In what are called the applied sciences, there is in truth a double process of construction and analysis. The observer must find a thought capable of giving unity to the phenomena as facts, and thus making the testimony of sense intelligible. Then, from the opposite pole of thought, comes the theory, the conception by what kind of force this unity of observed facts could be produced. But in each case, in the interpretation of the facts, and in the application of the theory to account for them, the process of thought is one. First comes construction ; then analysis. The conception why should not the power which draws an apple to the earth extend to the moon, flashed upon Newton's mind, according to the generally received account, at once. Then began his patient and wonderful achievement of decomposing this assumed force into its elements, to discover what effects it ought to produce, if it existed ; "keeping," as he tells us, "the subject constantly before him, and watching the light increase by little and little, till it changed into complete clearness."

So it is in every other sphere of human energy,—in poetry; in art; in industrial invention; in practical life. The ballad, or epic, or drama, or song, flashes on the constructive genius of the poet as an entirety, where some conception unites a mass of varied parts into one internally consistent whole. With long laborious exertion he strives to realize in words, the grandeur or beauty of his ideal: of which the critic, who follows him, will endeavour to point out or to conceal the traces, as he is friendly or unfriendly to his author. But the nature of the poetic process remains unchanged; the great singer is, as the Greeks truly called him *poietae*, “a maker.” The constructions of his thought stretch before his mental vision in outlines, more or less defined according to the richness of the materials for conception furnished by his observation. By degrees they become analysed into their parts and clothed in speech; which embodies in a form perceivable by other men, what originally could be discerned only by its creator. The work of genius stands revealed.

Again of music, “the melody,” says Haydn, “is everything. Give me the air, the rest is almost mechanical.” So a painting must offer some thought giving it unity, be it only the disposition of light and shade, or we shall regard it with indifference. Mr. Ruskin lays down as an axiom of art, “that a great composition has always some leading emotional purpose, technically called its motive, to which all its lineal forms have some relation;” he even asserts that no sketch from nature, however beautiful, could be introduced by a truly great master into his design without change, because it would not fit into the rest. “Everything,” he says, “in the work of such a man is connected; no atom of his work is unmodified by his mind;”¹ and quotes Fuseli’s dictum, that “no great idea was ever formed in fragments. He alone can conceive and compare who has the whole at once before him.”²

¹ Modern Painters, v. 168, 186.

² *Ibid.* ii. 144.

All art bears witness to this truth. In architecture, for instance, the church, or palace, or fortress, or dwelling, must have some pervading character, to which its details are subordinate: it must express some thought of reverence, or beauty, or majesty, or strength, or comfort, according to its object, if it is to satisfy the demands of our criticism. And if the architect does not begin by forming such conceptions, how is he to end by realizing them. Again, if from art we turn to inductive genius, the same rule holds good. Who can attentively read the lives of the men possessed of this faculty, without seeing that the general conception of each great invention has flashed on the inventor at once, as a whole, before he began to work out the details, which derive their unity from this idea, as it derives its utility from them. So, too, in practical life, our interest in the affairs, laws, and enterprises of mankind depends upon the perception of some object or tendency pervading them: or else is transferred to the actors, in whom unity of purpose takes the form of the manifestation of individual character by its reaction against circumstances.¹

¹ In this case, however, the interest may consist in the appearance of a plan manifested through man, rather than formed by him.

CHAPTER III.

The Conditions of Thought.

THE examination made in the last chapter shows that the faculty of thought of which we are conscious is essentially constructive, and that its so called "abstractions" are really the pulling to pieces of its own work. That there is some law or principle by which it is guided in its operations is therefore at least probable, And this probability is increased by a peculiarity attending all research into the origin of our thoughts, and wittily expressed by the saying, that "you may get a roomful of metaphysics, or a houseful, but not a handful." The thoughts involved in these inquiries meet us everywhere; they pervade all other subjects of thought; but, when we try to separate them from these subjects they appear to have no proper contents. We cannot get rid of the thought of cause, for example; yet if we ask what we mean by this thought, we get a host of particular causes, but no general one. Now this is what might be expected, if there be a law of thought affecting all its constructions. The thoughts connected with the operation of this law, would necessarily meet us everywhere; they would deal with a subject-matter most solid in its nature, absolutely incapable of being thought away, namely the power of thinking; and yet it would be as impossible to exhibit them apart from the exercise of this power, as it would be to exhibit the action of gravitation, apart from any gravitating substance.

Assuming, therefore, that a law of thought exists, the question arises, how can it be best studied? And to this

the natural answer is,—to study the law of thought in itself, we must withdraw our attention from any special object of thought, to fix it upon the thinking faculty exhibited in ourselves. Now we have seen that this faculty, in every application of it which we can trace, manifests a constructive action. Consequently, after we have withdrawn from consideration all special applications of the faculty of thought, there must remain the thought of a power of construction entirely undetermined,—a something, of which we can say only that it *is*. In this state the power of thought appears as a simple *being*, unlimited, undefined, void of all distinction, but which cannot be thought away. Now such a being is expressed by the thought of *space*. For what is this thought but that of an unlimited *power* of expansion, an infinite *possibility* of construction? In other words, the constructive power of thought perceives itself to be capable of conceiving unlimited movement in all directions, and expresses that intuition by the thought of space; which, indeed, does not exhaust the thought of constructive power, but is the first result of its effort to express itself.¹

Thus the thought of space is not only, as Kant has shown, the *a priori* condition of all perception, but also that of all particular thoughts; that is to say, of every thought except that of the bare *power* of thinking.

It may be objected, perhaps, that this position cannot be true of thoughts concerning spirit, of which it is the definition that it does not *occupy* space. But to think of that which does not occupy space we must think of space. Moreover, spiritual qualities have no reality for us, except in so far as we attribute them to some being which we con-

¹ Thus we can perceive why the thoughts of space and of motion are distinct; although, as Trendelenberg has shown in his valuable *Logische Untersuchungen*, ch. v., all attempts to explain the thought of space made by the profoundest thinkers, either imply the thought of motion, or fall into absurdity. The thought of space is *that of an unlimited power of moving*, which implies, but is not identical with that of the actual movement.

ceive to be manifested in space. Therefore if the thought of space does not directly enter into that of spiritual qualities, it does indirectly; as for the same reason it indirectly enters into the thought of God. A Deity whom we did not conceive to manifest himself in space, would be a nullity.

We arrive at the same conclusion as to the thought of space, from considering that all particular thought implies distinction. For to distinguish is to separate. And the thought of space is the thought of that in which the separation can be made.

Thus thought begins with the conception of an unlimited power of expansion. Now since this power is conceived to be exercisable in all directions, the thought of its exercise implies that of a centre to which these directions can be referred. That is to say, the thought of space is no sooner formed, than it distinguishes itself into two *opposite* thoughts, that of centre and circumference; which imply, while they deny each other. The centre is *not* the circumference, and the circumference is *not* the centre; but neither can be conceived without conceiving the other at the same time.¹

Further, these opposites insensibly graduate into each other. No limit can be assigned where the circumference shall cease to be circumference, till its vanishing point is reached in the thought of that "which hath no parts," and by this definition brings in again the thought of the infinity of "that which hath parts." On the other hand, however widely the centre is conceived to extend, the thought of a circumference will always appear beyond it.

Thus the thought of constructive power implies that of space; and the thought of space implies distinction; and this distinction implies the opposition of the thoughts dis-

¹ That the thought of a centre belongs to the faculty of thought, and is not an unconscious "abstraction" from our own individuality, appears from our having no difficulty in conceiving this centre to be out of ourselves; while we cannot get rid of the thought that it exists somewhere.

tinguished ; and these oppositions of thought deny, imply, and graduate into each other. These positions are true of all thought, as may be seen by testing the last, in which all the others are involved ; the blending of the opposites of thought into each other. Who will say where the outside of any object ends, and the inside begins ? What amount of difference will exclude any individual from the species, or family, or tribe to which we assign it ? How many grains make a heap ? What degree of conscious thought constitutes a responsible being ? What is the absolute limit between fitness and unfitness for the exercise of political power ? Where are the precise bounds to be drawn between liberty and license ? The incapability of restriction within any fixed limit, is a fundamental characteristic of thought ; which may be used sophistically by applying it to some particular case, to produce there a haze of uncertainty for those who are not aware of the universality of the law ; but is practically corrected by the opposite tendency of thought, perpetually to re-establish the distinctions it obliterates. If the circumference vanishes at the central point, it reappears in thought at the same instant as the surrounding immensity ; and so in every other case. The original operation of thought, in the construction of the thoughts of space and the centre encircled by it, is the type of all its subsequent operations.

The thought of *space* may therefore be defined to be, thought made visible to itself. Hence arise its apparent contradictions. We can set no bounds to space either on the side of expansion or of concentration, because we can set no bounds to thought. Fix them, and they are immediately overleapt. The thought of the limits of space is that of a space beyond, or within these limits ; and yet we cannot think of space, except as limited, as *a* space ; because thought separates only that it may unite. The thought of space is one continuous process of construction and division, and redivision and reconstruction ; and thus

expresses, in its simplest form, the universal action of thought.

Now since each of these opposite thoughts of expansion and concentration, separation and reunion, calls up the other, it may seem, at first, that we cannot escape from the charmed circle; but that the mind must perpetually vibrate between them. Yet a way of escape lies in that thought of *vibration*. To vibrate is to move forwards and back again, from and to a centre. Now the thought of a centre is that of a point; and that which moves from and to a point must itself be a point. Therefore the thought of vibration is the thought of a point, moving and ceasing to move; or the thought of motion and the limitation of motion; motion ceasing in one direction, to recommence in the contrary direction; and by its recurrence perpetually giving rise to a fixed centre. So that the primitive opposites of separation and concentration unite in this thought of vibration, to produce a being by a perpetual ceasing to be, or not-being.

But to think of a point moving, is to think of it as traversing successive parts of space. In other words, in this thought of motion, that of space passes into its great opposite, the thought of succession, or *time*. Time and space are, in truth, the two forms of the separating action of thought: the thought of *space* arising when the parts separated are conceived to be simultaneously co-existent; the thought of *time* when they are conceived to exist successively.¹ Hence each is involved in the other. The movement which enables us to realize the thought of space, produces the thought of time; while, if time is not to become an unreality to us, space with its three dimensions must be thought of as present at each successive moment. Space and time, as Reid has observed, have the kind of union assigned by the schoolmen to soul and body: "each

¹ Therefore Leibnitz defined space to be l'ordre de coexistence, and time to be l'ordre de succession, op. 751. See Dr. Mac Coah, *Mental Intuitions*, 216.

is in every part of the other; time everywhere, and space at all times."¹

A mystery has sometimes been attached to the fact that we think of time under one dimension only, and space under three, and no more; but the mystery rests on a mistake. What are called the *dimensions of space and time* are only convenient modes of measuring them. The thought of space is that of a power of free movement in *all* directions. Its dimensions are as infinitely numerous, as they are vast. For they are equal to the number of points on the surface of a sphere whose radius is infinite. The limitation lies, not in the thought of space, but in that of a *right angle*; and is simply this, that only three straight lines can be drawn through any point in the same directions, so as to be at right angles with each other. For the convenience of measurement, we refer the parts of space to some one set of lines thus drawn; but we may as well ask why we cannot think of a plane triangular figure with more than three sides, as why we cannot think of more than three such lines meeting in a point? We have limited our thought in a particular manner, and are bound by the consequences of our own act. So although every separate object of thought has its own order of succession, we refer all these separate times to a single line, for convenience of comparison.

In other respects time has the same characters as space; the character of self-limiting limitlessness: of bounds set only to be overleapt; and overleapt only to be set again. Fix a beginning or an end to time in thought, and we immediately think of a time before time began, or after it shall end. Again, to think of time otherwise than as a succession of limited times is impossible; and yet all these times are to our thoughts only parts of one time, and perpetually melt into the unity which rests upon them. The

¹ Intellectual Powers, 314. Hamilton's edition.

contradictions are inexplicable, till we perceive that the thought of time, like that of space, is the intuition by thought of its own boundless faculty of construction; which, in the thought of space it applies to the present, and in that of time to the past or the future.¹

The explanation given here of the thoughts of space and time removes the objection often raised to systems of ideal philosophy,—that they deny a real existence to the objects of sense. We must not confuse the intuitions of our faculty of thought, with the testimony of our senses. All that has been said applies to the *thoughts* of space and time, which confessedly transcend the limits of observation, not to the time or space perceived by us in relation to the objects of sensation. We possess an irresistible conviction of a world independent of, and external to ourselves; existing in space and time; as Reid affirmed, and Sir William Hamilton argues with overpowering learning and logic. Space and time, considered as conceptions resting on experience, express the observed relations of phenomena co-existent or successive, and are perfectly simple and intelligible. But as soon as we begin to *think* about space or time, we stumble upon bewildering contradictions, not derived from observation, and whose solution lies in the conception, that the *thoughts* of space and time present to us, in naked simplicity, the intuition of our own thinking

¹ Trendelenburg contends, in his *Logische Untersuchungen*, i. 110–122, that the thoughts both of space and of time are only different applications of the thought of motion. But there is more in these thoughts than this deduction explains. There is also the thought of the negation of motion—of repose; whose combination with the thought of motion in the conception of vibration, opens to us an escape from the overwhelming infinity of space, into the sphere of definite being. To treat the thought of motion as the primary form of thought, is contrary to common sense, which always associates motion with the thought of something moving; and is opposed to the highest metaphysical authorities, Aristotle, Kant, Hegel, etc. It is open also to the fatal objection, that we can think away the thought of motion; while we cannot think away that of the being of thought. The error arises from confusing the *thought* of motion with the *act* of movement. All our thoughts are produced by the movement of our thinking being, and necessarily imply such a movement. But its primary product, or in other words, our fundamental thought, is the thought of that which makes motion possible, namely, space.

being, with its infinite powers of separation and concentration.¹

It may perhaps appear strange that, if the contradictions hanging about the thoughts of space and time are instances of the universal operation of thought, we feel so bewildered by them in this case, and not in others. But the explanation lies in the fact that the contradictions are *patent* in the thoughts of space and time, because here we deal with the naked power of thought, while in all other cases they are *latent*, being disguised beneath the special limitations of thought, on which our attention rests. Yet, though latent, they do not the less exist. The thought of a circle, for instance, resolves itself into the mutual relation of "contradictory inconceivables," of the centre which "hath no parts," to the circumference which hath parts

See p. 260. ¹ The ancient puzzle of Zeno, that if Priam were a hundred paces ahead of Achilles, and ran at the rate of one pace while Achilles ran two, Achilles could never overtake Priam, derives its perplexity from insisting on one of these sides of the action of thought to the exclusion of the other side. The thought of the infinite series into which any finite space may be resolved in thought, is ingeniously substituted in place of the thought of the finite space to which it is equivalent. We unconsciously assume that Achilles must continue to run as long as we could continue to count the conceivable subdivisions of his steps; and as we could go on counting for ever, it seems that Achilles could never cease to run. But in this reasoning we talk of doing what we cannot do, and overlook the fact that *time* is an element of thought no less than space. If one moving body be thought of as overtaking another, the interval between them may be conceived to be subdivided, without absurdity, so long as *the time occupied in thinking of the subdivision is less than that occupied in traversing the interval*. But when the converse happens, the thought becomes absurd. We conceive that to be subdivided which no longer exists. So with Zeno's epigrammatic riddle, "the flying arrow rests," its motion being supposed uniform; because if so, there can be no change in the relations of the parts of its course; and that in the relations of which there is no change is at rest. It discloses the source of the perplexity in its proof. The arrow is shown to be at rest, by an argument drawn from the parts of its course. But if its course have parts, the arrow must be thought of as traversing them successively; that is, its supposed rest implies motion. In this double action of thought lies also the refutation of the hypothesis, that the mind thinks of space as extended, because it is itself an extended substance. If the mind derived the thought of space from the intuition of its own extension, whence does it derive the inseparable accompaniment of that thought, the conception of the vanishing centre?

In speaking of *observed space and time* we mean the *thought* of space and time applied to explain the phenomena of sensation. For the relation between thought and sensation, see chaps. vii. and x.

but "hath no breadth:" while space and time combine in the eternal present, in which the infinite here and there, and past and future, are summed up or implied. Now, of this we have no greater difficulty in thinking than we have in thinking of the unity formed by centre and circumference, or inside and outside.¹

Thus the action of thought consists in the production of unities, out of the distinction of opposites which are conceivable only when thought of as united. The thoughts of space and time unite in that of a point vibrating: and the thought of the motion of this point discloses a new phase of the law of thought, namely, that each unity formed by the combination of the opposites which express its action, may be used as a means of repeating the process of distinction and reunion, with a fresh result. The thought of a point moving is that of a line growing; that is, the thought of "becoming" or of "growth."² Now, though the point moves away the line remains. That is to say, the thought of "becoming," arising from the union of the opposite thoughts of "being" and "not-being," produces the thought of a something "become" or "grown," and possessing some determined characteristic. Thus from the undetermined thought of mere being, we pass to the thought of being—differentiated, being, with some distinc-

¹ Le moment qui s'écoule est déjà loin de moi. Sir W. Hamilton, Discussions, 81. But so is the edge of the most delicately marked centre, from the mathematical point. The objection that space and time are inconceivable, really confuses the *inconceivable* with the *unperceivable*. We cannot *perceive* points, or lines as they are mathematically defined, we can only *conceive*, or think of them. So we cannot realize as objects of sense, the space or time of which we think. But to say that, therefore, we cannot *conceive* them as objects of thought, is absurd.

² Mr. Mansel declares this thought to be inconceivable (Bampton Lectures, 53, 54); holding that though it is possible to think of an object as at one time not in being, and at another time in being, to think of it in its progress from not-being to being is impossible. But positive science depends upon such thoughts. The Newtonian astronomy, for instance, rests on assuming the planets to be subject to a force momentarily changing in amount and direction; that is, always "becoming" different. So if a plant grows, its form is always changing, and, in so far as it changes, passes out of not-being into being, and the converse.

tive property; in other words, to the thought of *quality*. The line left behind by the movement of a point must necessarily be thought of as *qualis*; as possessing some particular direction distinguishing it from all other lines left behind by the movement of other points.

Now, these lines, being conceived to be left behind by the movement of vibrating points, must be thought of as straight lines; and one straight line differs from other similar lines only by its direction; apart from this difference, each is a repetition of every other; identical and yet distinct. That is to say, the primitive thought of quality, by resolving itself into that of opposed qualities, produces the thought of *quantity*. Again, every quantity, however large or small, may be thought of as increased or diminished without ceasing to be a quantity. The more or less of it does not alter its nature. One or one-millionth is as much a quantity as one hundred or one hundred millions. And yet every quantity is distinct. It is a unity formed of many units. Unity itself is an apparent exception: but it is only apparent. Unity expresses the relation of an infinite denominator to an infinite numerator. The foundation of the thought of quantity is the straight line, which embraces an infinity of points. Therefore "one" can be infinitely subdivided, as we see in fractions. But the indefinite thought of quantity is thus resolved into that of an indefinite quantity of definite quantities, units, tens, hundreds, etc. etc., none of which can be increased or diminished without changing its nature. In other words, the thought of quantity, by distinguishing itself within itself, reproduces the thought of quality, under a new aspect. Between these unities of quantity there exist *relations* independent of their specific magnitudes.

$$2 : 4 :: 3 : 6$$

The union of quantity with quality produces the thought of proportion or *measure*.

The relation of quantity to quality deduced here from

the simplest action of thought, may be illustrated by endless examples. The qualities of all objects are intimately associated in thought with their quantity. The cottage becomes a mansion, the mansion a palace, the palace a town, simply by the multiplication of its parts.¹

But with the conception indicated by this action, we enter upon a new phase of the process of thought. From the original intuition of it, as a constructive power, we have come to see in it a faculty of (1) determining distinctions, and (2) combining them into unities of parts standing in definite relations. We proceed to examine the character and consequences of this operation.²

¹ We may anticipate our argument, by pointing out the analogies of natural action to the action of thought, in this passage of quantity into quality. By augmenting or diminishing the quantity of heat of any substance, its quality will change from solid to fluid, or gaseous, and the converse. Again, the qualities of chemical compounds depend on the relative quantities of their ingredients. So Aristotle's celebrated doctrine of virtue being a mean between opposite extremes, shows that the principle of proportion enters profoundly into morals. It may, perhaps, be objected to the statement of this passage of quantity into quality, that a definite figure, as a circle, may be conceived to be indefinitely increased or diminished without changing its quality. But the thought would really change, from that of a circle, to that of a series of concentric rings or waves.

² The students of Hegel's Logic will have remarked the important difference between the doctrine of *being* expounded there and that proposed here, in the introduction of the thoughts of space and time as the foundation of all other thoughts. Hegel, from causes noticed in a subsequent chapter, removed these thoughts to the commencement of the second part of his system, where he undertakes to deduce the universe of sense *a priori* from the action of thought, and begins his logic with the thought of being, deducing the thoughts of becoming, of quality, quantity, etc., from the supposed *passage* of this thought of being into its opposite, the thought of not-being, and the converse. But, as Trendelenberg has forcibly shown, in his *Logische Untersuchungen*, i., this *passage* implies the thoughts of motion and succession, and these imply the thoughts of space and time; so that if the latter thoughts are shut out, as they are in Hegel's deductions, the *passage* is inconceivable, and Hegel's dialectical process cannot begin. Hence his system acquires a character of unreality, which it cannot lose, until the *thoughts of space and time* are distinguished from *observed space and time*, and referred to their true place, as the primitive utterances of the being of thought. It is one great merit of Hegel to have perceived that these thoughts flow from that being, and are not conditions imposed upon thought, as Kant supposed. It is his greatest error not to have seen that they are inseparable from the being of thought, and pervade all its utterances.

The assertion that new thoughts may be produced by distinguishing again the thoughts formed out of the union of previous distinctions, may at first

appear a piece of charlatanism. But if the process be carefully examined, it will be found simple and intelligible. The first operation of distinction and reunion evolves, from the primitive thoughts of space and time, the conception of vibratory motion, which resolves itself into the production of lines, and thus gives rise to the thought of quality. By repeating the process of distinction, we obtain the thought of many such lines; that is, of quantity: and by repeating the process of union, that is, by conceiving these lines to be bound up into different bundles, we obtain the thought of relation in its simplest aspect; namely, that of a proportion or measure subsisting between these quantities. The same alternate action pervades the stages of thought to be described subsequently.

CHAPTER IV.

The Development of Thought.

THE investigation of the conditions of thought conducts us to the consideration of the relations arising out of the distinction of the primitive thought of being, or constructive power, into that of divers unities of quality and quantity. Now these relations form two sets of opposites, depending upon the consideration of them in reference to space or to time, that is to say, as relations between combinations thought of as coexistent or as successive; and each of these phases of opposition involves three stages. In the first stage of the thought of relation we deal with the apparent distinctions subsisting between different unities of qualities and quantities, whose diversities make up the conception of *existence*, that is, the varieties of objects thought of as coexisting. Now objects thus regarded have an *identity* of *matter* with a *difference* of *form*. Each must be thought of as produced by some peculiar combination of the conceptions of quality and quantity common to all, whence arise their external diversities of appearance. Thus we arrive at the second stage of the thought of relation, where we pass to the consideration of this new pair of opposites, which unfold into a double opposition, reconciled in a profounder unity.

The *form* of any object may be thought of as limiting its *matter*, or the *matter* as limiting its *form*. In the first case we obtain the thought of a *whole* and its *parts*; in the second, that of a *power* and its *utterances*. And these

pairs of opposites combine in that thought of *outward* and *inward*, which produces the conception of *reality*.

In each of these stages we may discern the constructive action of thought, in the existence of a something, neither one with the distinctions expressed nor separable from them. The thought of any object is not that of a mere bundle of qualities. Gold may cease to be yellow or ductile without ceasing to be gold to our thoughts, and yet each particular object can be identified only through its distinctive qualities. Again, matter cannot be thought of except as having some form, nor form except as embodying some matter, some definable power. Yet we may conceive the form to vary, while the matter is unchanged, or the matter to change while the form remains.¹

Again we cannot think of a whole without thinking of it as divided into parts, nor think of a part without thinking of the whole of which it is a part; and yet the thought of the whole is more than that of the sum total of the parts. It includes also their connection. So, though the primary conception of a power is that of a something internal, this internal has a being in thought only in so far as it becomes external. The power is expressed by the totality of its utterances; and yet to think of all these utterances is not to think of the power. The thought of the force of gravity, for instance, is quite different from the thought of all that has come, or may come, out of it.

¹ The chemical perplexity, as to the possibility of assigning a determined size to the ultimate particles of matter, is due to not distinguishing the thought of matter and its forms from that of the space occupied by them. It is impossible to limit our power of subdividing space in thought, because here we deal with the primitive faculty of thought. But the thought of matter is the thought of this power modified in some particular manner. Therefore to think away all these modifications is to destroy the subject of our thoughts. When men say that it is impossible to think of an atom as so small that it cannot be thought of as subdivided, they mean, the space occupied by that atom. If an atom be conceived to be a unity of forces taking up a given space, there is no difficulty in thinking of this unity as indivisible; and the question how much or how little space it occupies is entirely one of experimental inference.

Again, we speak commonly of the inward as the real, and the outward as the unreal; yet we should pronounce capacities, possibilities, or desires which were only inward, and never uttered themselves, to be unreal; while, on the other hand, the outward act or phenomenon is valueless, except as an expression of the inward feeling or tendency.

In every case these opposites of thought shew themselves to be links in a chain, from which they cannot be separated without being destroyed. And these links become more and more closely serried as we advance. The simple relation of difference and identity resembles that subsisting between the opposite sides of a balance: it is the plus or minus of a common property. The relation of form and matter is that of powers mutually penetrating each other; while in the relation of outward and inward, the opposites of thought mutually produce each other. Add to the outward, and you increase the inward; penetrate to the inward, and you disclose a new outward. Thus we are introduced to those closer relations dependent upon the thought of succession, which form the *second* division of the present subject.

The consideration of relations contemplated as coexisting has led us to the thought of the real, of that which *is*; the consideration of relations contemplated as successive begins with the opposite of that which *is*, with the thought of that which *has been*, or *may be*. Now that which *may be*, must always be thought of as standing in a relation of dependence on that which *has been*. It is a *contingency* depending for its realization on previous *conditions*, and which cannot be thought of as realized without them. But each of these conditions must be thought of as produced by the power of thought present to them all; so that the thought of relations contemplated as successive, becomes that of a circle of contingencies, each arising from a past condition, and forming the condition of a future contingency. Now this is the thought answering to our concep-

tion of *necessity*: for of that which is said to be necessary we make two demands, (1) that it be what it is through its own power; (2) that it be derived, so that we may shew *why* it is necessary. Each of these apparently conflicting requirements is complied with by the conception of necessity given here. The circle of contingencies, taken as a whole, is a direct embodiment of the being of thought; but each particular contingency is necessary only because of the preceding condition. And this twofold aspect of the thought of necessity unfolds into a pair of opposite conceptions, through whose union we advance to a higher sphere of thought.

If in studying the thought of necessity we fix our attention on the underived character of the circle of contingencies composing it, we form the thought of *substance*.¹ Now in the thought of substance we distinguish *attributes* and *accidents*, which are really names for qualities and quantities. Each substance is what it is through its qualities: they make it *qualis*. But these qualities may be thought of as realised under an infinite variety of quantities. The conception of a triangle, for instance, may be presented to the mind under an endless diversity of angles, or length of sides, while it retains in every case the attribute of having its three angles equal to two right angles. Yet the attributes of a substance have no substance in themselves. All their being is derived from the substantial thought, realised in some one of its many forms.² Thus the conception of a substance and its unchanging attributes, passes into that of the changing accidents, which by their varying quantities bring the invariable qualities to light.³ The conception of a triangle, for instance, passes

¹ Therefore Spinoza defined God to be, That which is in itself, and can be conceived in itself, without being derived from the conception of any other thing, the universal substance from whom all particular being is derived.

² Hence Hegel called the system of Spinoza not Pantheism, but *Akosmism*, The world in it, is swallowed up in God. Encyclop. i., 302.

³ The accidents here spoken of must not be confused with what may be

into that of the infinite variety of possible triangles, in which it may be realised. Now this transformation conducts us to the opposite side of the thought of necessity, to the thought of the endless succession of causes and effects. It converts the fixed conception of substance into the protean conception of causality.

We usually arrive at the thought of *cause* by reasoning backwards from that of effects. Phenomena succeed each other. They appear to be the condition of each other, and we infer that the antecedent is the cause of the consequent. But this antecedent, when examined, turns into the consequent of a previous condition. The chain ever lengthens before us. We seek in vain to arrive at a first cause. The nature of the thought of causality appears to exclude it. For by a first cause we mean a self-limiting will, while by the secondary causes derived from it, we mean powers thought of as *limited* by their effects. And to suppose that there is in these causes anything which does not enter into the effects, any undetermined limiting power, is inconsistent with their conception. But although every cause must be thought of as entering fully into all its effects, it may be conceived to be so limited that it can produce an infinite variety of effects. For it may be limited by reference only to the *quality* of these effects, leaving their *quantity* to be determined, in each case, by some special limitation superadded to the common conception realised in all. Thus the thought of a rectilinear triangle, that is, of the figure produced by three straight lines mutually intercepting each other, is the cause of all the infinite varieties of triangles, through which it may be realised by special determinations of the quantities of the sides and angles.

called accidental accidents, as, *e.g.*, the material on which a triangle may be inscribed; matters quite indifferent to its manifestation, and to be carefully distinguished from the true accidents, that is, the particular quantities through which the qualities of any object are expressed; though peculiarly liable to be mixed up with these last, when we apply the thought of substance to natural objects.

Now, since the thought of quantity always involves that of quality, it follows from this relation of the two thoughts, that the conception of a *limiting* will does enter into the thought of causality, from which at first it appears to be excluded. The quantities manifested in each effect are limited by the qualities constituting the *class* of effects thought of. They must be such quantities as are consistent with these qualities. But this originating cause is not first or last, but ever present; every quantitative effect stands in a direct relation to the qualifying cause pervading all. The effects may succeed each other in this or that order, but they succeed in a circle all whose radii lead to the centre. And these effects in turn determine the cause by which they are determined. Every quantitative expression of the common power limits that power, through the will determining the special quantities. So that the thought of cause is that of a will at once limiting and limited, both as quality and as quantity.

Thus in the conception of causality the thought of endless succession is inseparably wedded to that of ever present originating power, the finite determination to the infinite determining will.¹ Cause and effect stand to each other in the relation of *action* and *reaction*. Each produces its opposite in realising itself. The cause exists in giving rise to a succession of effects, of which each modifies the producing cause.² Now this is also the relation of the

¹ From not perceiving the conception of an ever present determining power implied in the thought of cause, Sir W. Hamilton produced the strange paradox that the conception of causality results from the feebleness of our intellects. He figured the relation of cause and effect, as a straight line, and pitilessly transfixed the human mind on its endless ends. The true relation may be illustrated by the connection of the angles in a circle, if the radius be conceived to move from 0° to 360°. Each angle in succession is a consequence of the precedent, and condition of the subsequent. Yet each is produced independently by the action of the common cause, which subsists equally in each, and is reproduced by the thought of each effect.

² It has been alleged that the relation of cause and effect here expounded is not their universal character. The earth's shadow causes night, but it is said night does not cause the earth's shadow. Yet how comes the earth to cast a shadow, but from the possibility of darkness; the fact that all bodies do not

thoughts of substantiality and causality. The accidents of a substance while they are effects of its substantiality, determine the character of the substance which causes them. The internal action gives rise to an external, which reacts on the originating power. But the conception of this play of equally balanced powers introduces us to a new thought, in which the relations of coexistence and succession unite,—the thought of *individuality*.

We come to the thought of action and reaction through the conception that cause and effect are names for equal and opposite actions. Now two modes of action thought of as equal and opposite, must assume the character of two *distinct centres of action*, two individualities of force, of which each affects the other, and is equally affected by it in turn.¹ Thus the different centres of force into which the thought of cause and effect falls asunder, constitute a unity of powers, of which each, in asserting itself, helps to preserve all the rest. Such is the primary or causal aspect of action and reaction. It leads us to the thought of its opposite to the substantial aspect.

To preserve the individuality of each centre of action, the forces composing it must be thought of as drawn together by their constitution. Each part must find in the other a something implied in its own existence; that is to say, the thought of centres of force becomes that of *polar force*, where the most entire union is produced by the most complete opposition. Poles are emphatically opposites; but the one cannot be conceived without simultaneously conceiving the other. Each is at once the cause and the effect of its opposite, whose action it supplements, and

produce or transmit light. The darkness in itself is indeed only a negation of action; but that negation manifests a reaction of the earth against the action of the sun's light; and this reaction causes the shadow.

¹ This is the great scientific principle of the *Conservation of Force*. Each centre of action parts with a portion of its own being in acting upon any other, but receives from that other in some form as much force as it parts with, so that the totality of force is always the same.

neutralises ; and by this neutrality produces the thought of a substance resting on itself.

But beneath this conception of a substantial neutrality appears that of a causal activity. Polar action is the simultaneous production of equal and opposite effects by some common cause. Now such a cause must be thought of as a force moving outwards in opposite directions from a centre, and preserving its individuality by returning into itself. But a force so directed must come in contact with all surrounding centres of force, by its outward action ; and by its inward action must tend to draw these forces into its own sphere of action, and group them around its own centre. That is to say, we come to the conception of the kind of force displayed in vital or *organic action*. For of this it is the general character to preserve itself by perpetually drawing in the surrounding forces into its own sphere of action, to become parts of itself ; and again, in the process of its vitality, replacing them by others.

By this kind of action causal force is transformed into substance. Now the thought of a substance shuts out all which does not belong to its own individuality. Yet the thought of an organic substance arises out of an action which seeks to draw into itself all that is thus excluded. Here then is a development of opposites, pointing to the thought of a kind of action where that which is excluded may, through the fact of its exclusion, combine with that which excludes it. Such an action we see at work in *animal consciousness*. The animal lets the whole surrounding universe into its own being, through the gates of sensation ; the condition of admission being that the objects admitted shall *not* form part of its individual "me." And it not only admits the "not me" to a direct action on the "me," but proceeds to incorporate the two. It not only *perceives* the external world, but *conceives* it. And upon these conceptions it founds its own choice and determines its own action. But in the animal the principle of indi-

viduality stops at *separating* the "me" from the "not me," without truly *distinguishing* them. The animal transforms external objects into the subjects of its own consciousness; but it cannot assert its individual "me" against the action of these "not me's" when thus transformed. Its conceptions blend inseparably with its desires. Its will is taken captive by its own acts, and leaves its thoughts in the state of mere instincts; capable indeed of modification through the action of human will upon them, but unable to modify themselves. There is required a further step before the thought of the "me" can be disengaged from that of the "not me;" a form of consciousness where the "not me," by its action on the "me," shall produce a reaction of this "me," which may reproduce the "not me" by its own act. In this action thought would attain to *freedom*, while it effected a complete union between the thoughts (1) of substance and cause, and (2) of coexistence and succession. The animal is mastered by its sensations; therefore it is not free. But the thought of this imperfect will conducts us to the threshold of freedom. When we pass it we find ourselves in the home of true individuality, in our own consciousness.¹

¹ This deduction of freedom from the conception of individuality is not to be found in the logic of Hegel, who passes at once from the thought of action and reaction to that of freedom, by means of the proposition, that in action and reaction the two sides of the thought of necessity mutually negative each other, and merge in the higher unity of free conception. That Hegel could bring himself to take this immense leap, from the thought of action and reaction to that of free thought, was probably due to his wish to reserve the thought of individuality for a later part of his system, whence he readily shut his eyes to the want of continuity in that system, caused by this abrupt transition. That there is such a want of continuity is clear; for when we pass to the succeeding part of his logic, which treats of conceptions, we find ourselves in the presence of the thought of the Individual, who takes his place alongside our old friends, the General (the thought of being), and the Particular (the thought of relation), without having been introduced to our acquaintance. Now when we left the sphere of the General for that of the Particular, we were formally introduced to our new companion by Quality and Quantity. So now, when we leave the sphere of the Particular for that of the Individual, we ought to be regularly introduced to him by Substance and Cause, whose acquaintance we have already made.

CHAPTER V.

The Process of Judgment.

IN the thought of *being* we deal with the general conditions of all thought. In the thought of *relation*, we deal with the conditions belonging to thought when particularized; that is, when defined by some specific determination of quality and quantity. These conditions lie beneath all our thoughts of objects, and come to light on a careful examination.

For instance, let us take the simplest of all possible conceptions,—the thought of a rectilinear angle. Every such angle results from the thought of two direct movements crossing each other. This is its *quality*. By fixing the *quantity* of angular inclination in any particular case, we produce a measurable *relation* between the two movements, which will hold good, however far they are supposed to be continued. These are *general* conceptions affecting every angle. But since the determinations of quantity may be indefinitely numerous, and each one creates an angle having a special quality, the thought of these separate angles leads us to that of their *relations to each other, as coexisting in space*; that is, their geometrical relations. Here we shall find that each angle, while it *differs* from the others in the inclination of the lines forming it, *agrees* in the mode of its production; that they possess a common *matter*, namely, the space intervening between the lines forming them, with a distinctive *form*; and that this form is a *whole*, consisting of separate *parts*, namely, the lines constituting it; and is the *utterance* of a

peculiar *power*, displayed in the degree of separation between these parts. So that each is the *outward* expression of an *inward* principle, and therefore a *reality* to thought. But the thought of a power and its utterances leads to that of the *succession of these utterances*; that is, to the trigonometrical conception of angles. We think of each angle as successively generated by the movement of a line round a centre, from 0° to 360° . In this conception each successive position of the generating radius is a *contingency*, determined by its previous position as a *condition*, and constituting the condition of its future positions. The whole cycle of these conditions and contingencies forms a *necessary substance*, of which each successive angular position is an *accident*, while the whole arise as *effects* from the generating movement as *cause*. Now, the generating radius produces, with each successive angle, the complementary or opposite angle; so that at every moment of the angular *action* there is present the thought of its *reaction*, as an equal and opposite force. Hence every angle includes the thought of all other angles. Each has an *individuality*, but this individuality does not fetter our thought, but arises freely from its action; modifying our consciousness as a substantial utterance of thought, but itself modified by that consciousness at pleasure, according to its own needs.¹

The process of thought which we have traced does not depend on any particular phraseology. Whatever names may be used to denote its stages, the advance must always be the same; namely, from the thought of the general limitations of being to that of the particular relations

¹ In this operation the function of the *organizing* principle is performed by *language*. Every *name*, either unites a variety of particulars into an individual *quantitatively* determined, or unites a number of such individuals into an individual *qualitatively* determined, as in the word "angle." In either case, an object is produced capable of acting upon our thought and of being acted upon by it. A striking instance of the hold which the conception of *organization* has on our minds is furnished by the Pantheistic philosophies of the East, where, from the feebleness of the sense of individuality, the deepest thinkers have stopped at the thought that the universe is produced by a self-developing, unconscious, substance.

arising out of these limitations, considered first as to phenomena coexisting in space, and then as to phenomena succeeding each other in time, till the conception of individuality, by combining the thoughts of permanent being and endless succession, introduces us to the sphere of free thought.

Now, here we find ourselves at home in our own *consciousness*, and the power of conception through which we exercise it. The constructive action of thought proceeds from the general through the particular to the individual, and the formation of conceptions is the summing up of this process. Its issue is the commencement of ordinary logic, which begins with our conscious conceptions. And because it does begin there, the logicians have never clearly comprehended the nature of the conceptions with which they busy themselves.

It follows from our previous investigation, that every conception contains three phases of thought, the general, the particular, and the individual, in close union. Now logicians commonly class our conceptions into general, particular, and individual, and do not recognise the presence of each element in them all. But this classification depends upon the prominence assumed by the different elements of conception in different combinations of thought. In each case all three elements are really present. For instance, if we think of a circle, we have present to our minds, (1) the thought of the individual circle with the peculiarities of color, situation, etc., distinguishing it from all other circles; (2) that of the particular diameter or measure of quantity which enables it to be drawn; (3) that of the general quality of circularity, common to it with all other circles. So if we think of circularity, we must think of this general form (3) as capable of belonging to an unlimited number of particular circles (2), each of which will have its individual peculiarities (1). Or again, if we think of any distinctive

particularity of a circle (2), as *e.g.* a diameter two feet wide; this will involve both (3) the thought of a circular form, and (1) that of some individual circle in which this generality and particularity are combined.

If we think of some natural object, as for instance, a tree, the process is still more striking. How many distinct parts are there not bound up by thought into the conception of a tree! root, bark, stem, boughs, leaves, flowers, etc. etc. It may be objected, perhaps, that in such a case we have many particulars united into an individual, but no general thought. But that there is no force in this objection will appear, if we imagine ourselves to see some totally new object, as a mermaid, or a centaur. It is clear that we should feel no difficulty in imagining the existence of other beings of the same *kind*. That is to say, our thought of them would contain a general element, which indeed we might be quite unable to define, but should have no difficulty in using.

But it may be urged, if the formation of conceptions is the characteristic of all conscious thought, and if all conceptions include the general, the particular, and the individual, animals must be capable of forming general thoughts, since they possess consciousness. Why should we doubt that they are? Does not a dog know a man from a sheep or a cow, though he may be totally ignorant of the individuals? Is not a bee able to distinguish leaves from flowers? But if so, the conceptions of animals must contain the thought of the same *kind* of thing, as well as of the individual thing. The difference between the thought of the animal and that of man, lies, not in the original construction of conceptions, but in the way of dealing with them; in the reaction by which thought asserts its freedom against the results of the action upon it; whence, in the course of time, men have attained to the perception of those elements of all conscious thought which we have endeavoured to present in their logical order.

The distinctive action of human thought depends on the formation of *judgments*. For, in the act of judgment, we take hold of our conceptions, *apprehend* them as the logicians say, dissect them into their elements, and recombine these into a new conception, the product of free thought. This act of apprehension is really double. To construct our original conceptions, we must *apprehend* the perceptions involved in them ; so that apprehension enters into all consciousness. But the apprehension exercised in judging the unities constructed by thought out of these perceptions, is a distinct operation from that exercised in their construction. To judge a tree to be green, we must have the thoughts of tree and of green present to our minds. Then we take up the thought of each particular, examine it, and judge whether it properly belongs to the object to which we attribute it. But this judgment implies the existence in our minds of a conception of the object, into which this particular, or something nearly resembling it, has entered. The judgments, "this tree is green," "this four-sided figure is a square," depend on the exercise of the same process of thought, though they belong to opposite ends of the series of judgments which that process involves. Both are the results of an analysis, resting on a previous synthesis.¹

The series of judgments alluded to in the last paragraph forms four great classes, consisting of (1) Qualitative ; (2) Quantitative ; (3) Inductive ; and (4) Necessary judgments. It reproduces the succession of thoughts familiar to us : (1) and (2) dealing with the general limitations of all being ; (3) with relations considered as coexistent ; and

¹ See Appendix I. for observations on Kant's distinction between synthetic and analytical judgments. The psychologists are accustomed to draw between our perceptions and our sensations a distinction, which a writer in the Westminster Review for July, 1862, p. 88-92, contests, with much force of reasoning, though from a point of view very different to that taken here. The distinction is untenable. To become objects of consciousness, *sensations* must be distinguished from each other ; and so soon as they are distinguished, they are transformed into *perceptions*.

(4) with relations considered as conditioning each other: and each class comprises three judgments, of which the first and second are opposed, and the third is produced by their union.

I.—*Qualitative judgments* that deal with conceptions in their simplest form, as concrete sensible individualities.

This rose is red. This triangle has three sides, etc.

They assert the unity of the particular red, or three-sided, with the individual rose or triangle. But if we ask what we mean by red, or three-sided, we shall find that we mean a something which cannot be confined to the individual rose or triangle. The redness of any rose is only one phase of a general thought of red, which embraces an infinity of shades of redness. The three sides of a triangle may be thought of as capable of indefinite variation, without ceasing to form a triangle. The thought of each individual bears in itself that of an infinite possibility of distinct, though closely related individuals, produced by the union of parts differing from each other, but of which each is included in a general thought. Now in this process the *affirmative* phase of the qualitative judgment passes into the *negative* phase, into the judgment, "there are modes of quality which the individual examined does *not* possess;" a phase in itself *endless*, as Kant calls it, since no limit can be put to the possible modifications of quality, capable of entering into the conception of different individuals; but, by its union with the affirmatory phase, giving rise to the judgment of *limitation*; that is to the thought of boundaries between any particular affirmation, and those adjoining it, whereby the conception of distinct objects becomes possible.¹

¹ The name of "endless judgments" has sometimes been extended to the so-called "impossible judgments," such as the soul is not a table, not a stone, etc. Of these Hegel justly observes that they are not properly to be called judgments, inasmuch as the subject and predicate stand in no sort of relation. But he does not show when the true "endless" judgment passes into the "impossible." Trendelenberg, after ably contending that the natural nega-

II.—This thought of limitation conducts us to the *judgments of quantity*, with their three phases of unity, plurality, and totality. For the limitation depends on the thought that each quality of each individual is *one* phase of *many* possible varieties, and that each individual is one of many possible unities of these varieties. Thus the qualitative judgment, "this rose is red," passes into the quantitative judgment, "this is one of many possible red roses," which we do not indeed say, but always think; and in consequence instinctively assign to the qualities of the rose some internal relation through which they acquire a character admitting of application to many roses. The original rose becomes to our thoughts *one* phase of a type where *many* similar but distinct phases unite to constitute a *totality*. Thus we obtain a fresh subject for analysis, in the thought of relation brought to light by our first analysis. And this analysis we carry on by the group of inductive judgments, whose office it is to trace out the typical relations concealed beneath our primitive judgments.

III.—These *inductive judgments* begin by an *assertion* assuming that there are principles of unity beneath the plurality of appearances. The judgment, "this bridge is strong," for instance, assumes that fixed relations exist between the parts of the bridge, giving them the power of resisting pressure. The judgment, "gold is yellow," assumes that there is a something in gold which causes it to be yellow. But what this may be we do not know. Therefore we try to discover it by excluding from our thoughts all but one of the peculiarities of the object, and selecting that, to discover whether it will account for our judgment.

tive judgment has essentially positive contents, proposes to banish "endless judgments" from logic.—*Logische Untersuchungen*, ii. 186. But this seems to be a mistaken proposal. Negative judgments have positive contents, and yet are truly "endless," without being "impossible;" because their proper function consists in marking off the endless varieties, which lie as possibilities in the thought of every individual. The "impossible" judgment begins, when we try to pass by negation from one class or kind of individuals to another.

Thus the *assertatory* judgment passes into the *problematical*. "If the bridge is of stone it will be strong." "If the gold is pure it will be yellow." The union of this *problematical* judgment with the assertatory produces, as the third stage of the process, the *apodeictic* or demonstrative judgment. "The bridge is of stone; *therefore* it is strong." "The gold is yellow; *therefore* it is pure:" whence is derived the universal affirmative of ordinary logic, "all equilateral triangles are equiangular;" "all yellow gold is pure."¹

IV.—By the last set of judgments we have *induced* upon our primitive judgments of quality and quantity the thought of definite internal constitutions, belonging to the objects of our thought, in virtue of which they possess distinctive properties, and enter into definite relations with each other. Through this conception our judgments assume a character of *necessity*. But we have already seen that each of these objects is a unity of qualities admitting of indefinitely numerous modifications, of which it arrests one phase only. Hence the constitutive principles embodied in them must admit of a variety of modes of expression, producing classes of closely related objects. This thought gives rise to the *hypothetical judgment*.

If gold is a metal, so is silver.

If an isosceles triangle has its three angles equal to two right angles, so has a scalene triangle.

¹ Much confusion arises as to the nature of our judgments, if we deal with logical symbols instead of with the current coin of thought. The so-called categorical affirmative, A is B, will apply equally to the judgments, "this rose is red;" "this bridge is strong;" "the three angles of this triangle are equal to two right angles." But the difference of the mental operations connected with these judgments becomes apparent, as soon as the thoughts connected by the copula are substituted for the unmeaning signs. In assertatory judgments the ambiguous use of names is another source of confusion. Thus Hegel distinguishes the judgment, "gold is yellow," from the judgment "gold is dear," by observing that "yellow" has a relation to the nature of gold, while "deariness" has not: a position undeniable, if gold is thought of only as a particular kind of metal; but, in the last of these judgments, gold stands for a particular medium of exchange, to the nature of which "deariness" and "cheapness" is very essential.

Here we import into the conception of types of form the thought of *plurality* originally produced by the examination of individuals. We form the thought of sub-types ; and hence pass on to that of a *totality* constituted by all these sub-types : a thought expressed in the *disjunctive judgment*.

Metals are either gold, silver, copper, tin, etc.

Triangles are either isosceles, equilateral, or scalene.

Thus we have applied to the conception of types two of the factors common to all conceptions, namely, the thoughts of the particular and the general, of plurality and totality ; and these combine to produce the thought of individuality in the last form of judgment, where the primitive individual of animal sense is replaced by the ideal individual of thought. In the disjunctive judgment we seek to constitute a totality of sub-types, and thus to determine the nature of the fundamental type underlying them, by a process of exhaustive enumeration. In the *ideal judgment* we seek to determine the relations of the parts of this type, and thus to include all the possible varieties of sub-types and individuals. Hence the ideal judgment always has the form of a definition.

A triangle is that plane figure which is formed by the mutual intersection of three lines.

A plant is that form of being which constitutes the link between inorganic and conscious existence.

Virtue is that which ought to be the rule of human life.

The last instance illustrates one application of this form of judgment so extensive, that it led Hegel to propose as its second name that of "moral judgment:" the judgment which finds its essential subject matter in the will. For moral judgments are always judgments as to principles ; though they are applied to particular facts, they claim to assert an unchanging self-regulating will, by which all these facts shall be pervaded and moulded.

The series of judgments traced here are nature's school-

masters, through whose teaching man first becomes aware of that substratum of limitations and relations, which underlie all his conceptions, and constitute the possibility of his consciousness. The process begins with the earliest application of man's faculties to apprehend the universe about him; and the elements of thought which we have endeavoured to disentangle, become confused in men's minds with the objects of sense, to whose interpretation they are applied. Hence the task of disentanglement has been long and difficult, and it cannot be surprising to find that the true nature of the ideal judgment, and its relation to its sister forms, have often been greatly misconceived. In the light in which it is here exhibited, it forms the goal sought in all our judgments; and what we commonly call the *proof* of our reasoning is only the process by which we feel our way towards it. For the formation of conceptions answering to the demands made by our ideal judgments, that is to say, the accurate definition of true typical thoughts is a work of long laborious effort. It involves the process of reasoning, conducted by what are called syllogisms, and we must therefore now turn our attention to their consideration.¹

¹ See Appendix II. for further remarks on the order of judgments, and on the views of Kant and Hegel in respect to them.

CHAPTER VI.

Inductive Thought.

IN the syllogism we separate each of our original judgments into two opposed judgments, which we lock together in our conclusion ; as in the example dear to logicians :

All men are mortal—Caius is a man—therefore Caius is mortal.

The ablest expounders of common logic, such as Archbishop Whately, tell us that this operation is only a process of comparison. We compare, they say, the individual case of Caius with the general case of man ; and, having ascertained that the individual case is included in the general, we infer that whatever belongs to the class must belong to every member of it. Now, no doubt this is true. We do go through this operation, consciously or unconsciously, in coming to any conclusion ; but why should we do so ? Why cannot we be satisfied with affirming at once, Caius is mortal, instead of going through the round-about process indicated by the logicians ? If to be mortal is essential to a man, how can we know that Caius is a man, except we know that he is mortal ? But if we know that, we know all that the syllogism undertakes to prove to us ; and if we do not know it, we assert that of which we have given no proof. Thus the whole operation appears either useless or ungrounded. Yet the only account given of it by the logicians is, that such is the nature of thought.¹

¹ See Whately's answer to Campbell's objections. Logic, sec. 4, p. 33.

A yet graver objection to this explanation lies in the fact, that while, according to it, all reasoning consists in referring individuals to classes, we notoriously obtain our notions of classes by reasoning from individuals; whence it follows that, if Dr. Whately is right, we never could begin to reason at all: since our power of reasoning would depend upon our previously possessing the notions which we really gain by the process of reasoning.

To overcome this objection, Sir William Hamilton assigns the formation of general notions to an instinctive tendency of thought; to assume that properties observed in more than one individual belong to a class which those individuals represent: whence, if any of these properties are observed in any individual, we infer that it will possess all the other properties belonging to the representative members. Like all the metaphysical doctrines of Sir William Hamilton, this theory is marked by great insight and acuteness; yet it is unsatisfactory. The process of inductive reasoning is as follows:—We observe certain objects resembling each other in certain respects, as color, weight, hardness, etc., to possess a particular property, say that of attracting iron. Then, when we find another substance resembling the first in these appearances, we infer that it will resemble them in other properties, and therefore will attract iron. The question is, why we feel justified in coming to such a conclusion? The older logicians, as Sir William informs us, supposed that the argument, if stated at full length, would stand thus:

A B C are x—D is A B C—therefore D is x, and called the suppressed premiss (D is A B C) *constantia*. To this explanation Dr. Whately objects that it is absurd. To apply it to the case of the magnet; it would make us reason thus—A B C (the known cases) attract iron: D (the unknown case) is the known cases: therefore D will attract iron. Now we certainly do not so reason. On the other hand, Dr. Whately's own explanation leaves the difficulty

untouched. He says that we reason thus : What belongs to A B and C will belong to D : but A B and C attract iron ; therefore D will attract iron. Now that we do make the assumption, " What belongs to A B and C will belong to D," is undeniable ; the difficulty is to see *why* we make it. And of this Dr. Whately says nothing, but refers us to the physical sciences ; as if science underlay thought, and were possible without thinking. Sir William Hamilton, rejecting this hypothesis, contends that we argue as follows :

$x y z$ are A— $x y z$ are B—therefore B is A, or

A contains $x y z$ — $x y z$ constitute B—therefore A contains B.

The form appears plausible enough ; but it is impossible to apply it unaltered to any case of actual reasoning. For instance : $x y z$ are magnets : $x y z$ attract iron : therefore magnets attract iron. Clearly this will not justify the conclusion that D, a newly observed object, will attract iron. There is wanting a proposition to connect D with $x y z$.

Mr. J. S. Mill avoids this difficulty, by suggesting that the suppressed premiss in inductive reasoning is :

"Attribute A is a mark of attribute B."

But though he thus escapes the great stumbling stone of supposing the thought of a class to be formed from an enumeration of cases not including all the members of that class, his explanation is open to the same kind of objection as Dr. Whately's. It states the actual process of our reasoning, but shows no ground for it. Why should we suppose that the possession by a certain stone of the "attributes" of a particular color, weight, shape, etc. will be attended by the "attribute" of attracting iron ; because other stones, resembling it in possessing the first set of "attributes" also possess the last ? We obtain no answer from Mr. Mill, and must seek a way out of the difficulty by a more thorough investigation of the true nature of the syllogism.

We have seen that the ideal judgment is the conclusion of a long series of judgments, of which the proof lies in this result. Now the office of the syllogism is to carry our thoughts from the first glimpse of the ideal judgment, which we gain in our conceptions of the objects of sense, to the complete apprehension of it. In the process of judgment the connection between our judgments is only assumed; in the syllogism it is made apparent. Syllogisms form three groups—I. the Syllogisms of Perception; II. the Syllogisms of Induction; and III. the Syllogisms of Necessity; corresponding to the three last groups of judgments, and *constituting together the process of inductive thought*. They form three classes, not four, because the first class of judgments, those of quality, are incapable of any proof but inspection. If any one should deny the judgment, "this rose is red," the only answer possible is, "look at it." It is not until the thought of quality has wedded itself with that of quantity that the conception of proof arises, and the syllogistic or inductive process begins.

I.—If we take such a judgment as "this rose is colored," it becomes possible to ask "why?" "how do we know that?" And we may obtain the answer, "because it is red, and red is a color." Now here we have converted the observed fact that the individual rose is "red," into the assertion that its tint is part of a unity of many tints, to which we give the name of color. The individual rose has become to us one among many roses, each of which may be thought of as distinctively colored. Therefore, though we may confine our thoughts to the individual, they spontaneously indicate the typical character belonging to them, by the use of the words "all," or "some," to denote the quantity of objects included under the assumed type. The syllogism has brought to light the secret ground of our judgments of perception, namely, that the individual is conceived as part of a generality, into which it is bound up by the particular. If we call the

Individual, I; the Particular, P; and the General, G; and arrange the propositions of our syllogism in their logical order:

This rose is red—red is a color—therefore this rose is colored,

the syllogism will have the form

I — P — G,

constituting the *first syllogistic figure*; where we conclude from the individual, to the general, through the particular.

In this operation the individual has become to us one of many individuals, with which it is bound together by common characteristics. But we have not discovered the ground of the judgment thus passed on it. This, therefore, we proceed to seek in the opposite thought, that of these characteristics. We take any two of the different characteristics of our individual, say redness and thorniness, and ask how they are related. Now we know nothing about them, except that they meet in the thought of our typical rose. We assume this fact, then, as the basis of our operations, and argue:

This rose is colored—this rose is thorny—therefore a thorny thing may be colored.

Here our syllogism takes the *second figure*,¹

G — I — P.

In this process we treat one characteristic of the rose as general, and one as particular, though both are really idealized into generalities; and we are justified in so doing, because the generality of each consists in its being a unity of many particulars; whence it can enter as a particular into many individuals. And we are at liberty to treat either particular at pleasure as forming part of the unity constituting the other; because all that we know of either characteristic is that each is part of the same ideal

¹ The second and third figures of common logic are transposed in the order followed by us. The reason of the transposition will appear as we proceed.

individual, which forms the bridge for thought to pass from one particular to the other.

Hence arises the rule, that in the second figure the conclusion must always be in the particular. In consequence, we are not able by means of this examination, to explain the ground of our judgments. But the process conducts us to a third subject of inquiry. We have seen that each characteristic is thought of as a unity of many parts, and through this circumstance becomes applicable to more than one individual? If we cannot discover the ground of the relation which we divine among the different characteristics of the same ideal object, by examining these characteristics, may we not discover it by considering the relations of the same characteristic to different individuals. To ascertain this point we attempt to grasp these individuals together, by the thought of a common characteristic, and argue, say :

A rose is colored ; a geranium is colored.

But in this form we could not come to any conclusion ; for we have two individuals and one general, but no particular. To bring out any result we must vary the process. Since we have one characteristic only whence to manufacture the particular and the general, we are driven to give generality to the particular, by including it among the infinity of all that we *cannot* ascribe to the individual. For instance, we may say, “a rose is red ; a forget-me-not is *not* red.” and logically conclude, therefore a forget-me-not is not a rose. The thoughts of rose and forget-me-not are incapable of uniting ; for the one is, and the other is not included in the unity of redness. The syllogism in this case assumes the *third figure*,

P — G — I ;

and its conclusion is necessarily negative.¹

¹ Mr. Davies alleges (A B C of Thought, 92) that this rule is not true of syllogisms in what he calls the whole of comprehension ; and adduces in instance, the axiom “things equal to the same thing are equal to each other,”

Of this third figure we may observe that it holds in equal balance the opposite thoughts of the individual, and its characteristics, of which, in the previous figures, one or the other is the predominant subject. Collectively, the three figures prepare the way for the syllogisms of induction, by leading us from the thought of the individual objects presented to our senses to that of the relations through which these objects constitute natural groups.

II.—We have seen that, although two individuals may have common characteristics, this will not enable us to assert a unity between them, either from studying these characteristics separately, or from considering two or more characteristics in their general relations to each other. But we have found also, that each individual presents a combination of many characteristics; and the study of individuals attending the syllogisms of perception, shows that, while these characteristics are combined in infinite variety, the individuals exhibiting them fall under distinct types. Their characteristics appear to be put together on some definite principles. For these, therefore, we begin to search: and in conducting this process, we seek for such characteristics as will best enable us to refer any individual to its supposed type; in the confidence that, if the reference is rightly made, the individual so referred will be found to possess other characteristics commonly observed in other individuals belonging to the same type, though not yet noticed in the particular instance.

This is the *act of induction proper*; an act involving three distinct steps, constituting three syllogisms, and resting upon two premises directly derived from our con-

which is, he says, a syllogism of the form $A=C \ B=C \therefore A=B$. But this is to confuse syllogistic reasoning with the constructions by which the intuitions of geometry are made sensible to our minds. The conclusion of equality if reduced to a syllogistic form would be as follows: A and B have the same measure: figures having the same measure are called equal \therefore A and B are equal. The introduction of C is only to serve as a common measure for A and B. See Appendix I. for further remarks on the judgment of equality.

sciousness of a constructive action in our own thoughts, without which it is inconceivable that we could form the conception of typical forms at all.

(1) We begin by observing different individuals to possess analogous peculiarities; say, an upright gait, two legs and arms, distinct speech, etc. Hence, from the maxim, similar particulars, similarly grouped, imply a similar constructive principle, we infer that each of these individuals may be regarded as a particular case of a general type. This operation gives rise to the *sylogism of analogy*, the first figure of the syllogisms of induction; with the form

$$I - G - P:$$

the third figure of the syllogisms of perception inverted.

(2) From the converse maxim, that the similar constructive principles expressed in any type must be expected to produce similar characters in every individual in whom the type is realized, we infer that, whatever characteristics are generally manifested by the individuals belonging to any known type, will be manifested by any individual whom, by our first figure, we have referred to it. This is the *sylogism of induction proper*. We *induce* upon the new individual the result of our observation of past individuals. It takes the second figure of the syllogisms of perception,

$$G - I - ' P.$$

(3) Now we are ready for our conclusion. By the syllogism of *analogy* we have inferred that Caius is a man; because he possesses various particularities characteristic of the type, man. By the syllogism of *induction* we have inferred that, if Caius belongs to this type, he will exhibit all the particularities characteristic of it. Whence we confidently conclude, by the syllogism of *reflection*, in the first figure of the syllogisms of perception inverted,

$$G - P - I,$$

that, since mortality is one characteristic of a man, our friend Caius will die.¹

It may be objected to this explanation, that the syllogism of analogy violates the established rules relating to the third² syllogistic figure. It has an essentially positive conclusion, and a middle term which is the subject of the major, and predicate of the minor. But herein lies the magic of thought, by which, in this syllogism, it transmutes negative into positive. The syllogism properly belongs to the third figure; for it rests upon negatives. No two individuals are the same. Yet from the analogy of their differences we infer that they are manifestations of the same power. Now to recognise individuals to be different, is to deny their similarity. We arrive at the thought of their oneness by the negation of this negation; by merging the thought of their specific unlikeness, in that of the likeness of the power whence they arise. That we thus act, arises from that relation between the thoughts of *quality* and *quantity* already explained. Every object of thought is determined by its qualities; and every quality admits of an infinite variety of quantities. It is the quality of a plane triangle, for instance, to be formed by three lines, mutually intercepting each other: and this quality underlies an infinity of individual forms, and gives them all a common character. The instinct of thought has led men to apply the same principle to explain the phenomena of nature; *inducing* upon their endless differences the con-

¹ Stated at full length, these syllogisms are as follows:

- | | | |
|--|--|---|
| 1. A B C D and Caius have analogous particularities. | That which has analogous particularities cannot have a different type. | ∴ A B C D and Caius have a not-different, that is, a similar, type. |
| 2. That which has the type of A B C D etc. (that is, of men) will have all the characteristics of men. | Caius has the type of A B C D etc., that is, of men. | ∴ Caius will have all the characteristics of men. |
| 3. All men are mortal. | Caius is a man. | ∴ Caius is mortal. |

² In common logic, the second.

ception of constitutive types, through which this variety may resolve itself into unity.

The peculiarity of the syllogism of analogy noticed above, is the cause of the perplexity felt by logicians in dealing with induction. They have tried to reduce to the common syllogistic form, that which has a form of its own, as Sir William Hamilton rightly saw, though he failed to explain satisfactorily what the form was.¹ That they should not have comprehended the peculiarity of inductive reasoning is, however, not surprising, for they have usually considered syllogisms separately, while the process of induction is intelligible only in connexion with what precedes and follows it.² It is a middle term, leading from the thought of the individual to that of the general, and partakes of the character of each side. It begins with the negative thought to which the third figure of the syllogism of perception leads,—the thought of individual differences; transforms this thought into its opposite, namely, into the thought of a oneness lying beneath these differences; converts this third figure into the first figure of its own process, by reversing the order of its terms; and ends with a syllogism having the figure of the first syllogism in the following group, but without its distinctive feature. The proposition, man is mortal, means only, all the men whom we know anything about have died. It supplies no thought as to the nature of man, whence it can be shown that a man must die. Nor does

¹ Sir William Hamilton distinguishes three steps in the inductive process.

(1) "The observation of particulars;" answering to the syllogism of analogy. (2) "The material illation of the universal from the singular, warranted by the analogies of nature;" answering to the syllogism of induction. (3) "The formal illation of the universal from the individual, legitimated only by the laws of thought;" answering to the syllogism of reflection. But if we ask what is the law of thought which "legitimizes" this "illation," the only answer we get from Sir William is, that we are under a necessity of so thinking. See Discussions, 137.

² Hegel was the first to see that the different kinds of syllogisms form together one connected system of thought, though, in the judgment of the present writer, he did not perfectly explain that system. See Appendix II. upon this point.

it even tell us how to recognize a man when we see one. It takes the existence of a human type and its properties for granted, and contents itself with affirming that there is something about the particular individual whence we may infer that he belongs to the type, and will possess its characteristics.

That we draw such conclusions with the confidence with which we do draw them is intelligible only through that doctrine of ideas, in opposition to which the inductive process has been set up as the only true source of knowledge. If inductive thought flowed only from the experience of phenomena, it could not rise higher than its source: its certainties would be felt to be mere accumulations of past observation, liable at any moment to be upset by a new observation inconsistent with the past. And so Aristotle regards it. Of the knowledge obtained by *epagoge* or induction, he says expressly, that it rests on the *whole* mass of observations; whence, apparently, in his judgment, its importance came.¹ But thought refuses to stop at this point. We have an instinctive consciousness that nature is penetrated by ideas; though we may not have been able to reduce them to intelligible conceptions. This is the true source of our faith in reasoning from the present to the past or the future. We believe in the uniformity of nature, because we divine, though we may not understand, the unchangeable thoughts expressed by her phenomena.²

¹ 'Ἡ γὰρ ἐπαγωγή διὰ πάντων ἔστι δὲ ὁ τοιοῦτος συλλογισμὸς τῆς πρώτης, καὶ ἀμέσου προτατέως. "Ὡν μὲν γὰρ ἔστι μέσον, διὰ τοῦ μέσου ὁ συλλογισμὸς ὧν δὲ μὴ ἔστι, δι' ἐπαγωγῆς.—Anal. Prior. II. sec. 23. Compare Anal. Post. I. sec. 14; and Topic VIII.; where he distinguishes reasoning, διὰ τῆς ὁμοιότητος, from that δι' ἐπαγωγῆς. In Topic I. sec. 10, however, he uses ἐπαγωγή in a more general sense, as ἡ ἀπο τῶν καθ' ἕκαστα ἐπὶ τὰ καθ' ὅλου ἐφοδος; and illustrates it by the argument that skill must be useful in a charioteer, because it is useful in a pilot. But this use of ἐπαγωγή is as much more lax than our use of induction, as its use in the passage first quoted is more stringent.

² It is interesting to observe whence the original central thoughts, round which we group the endless varieties of possible individuals, are derived. Our primary classification of natural objects rests on conceptions embodying the primary expressions of quality and quantity; on thoughts of the *direction* and

III.—When the syllogisms of induction have conducted our thoughts to the conception of types under which to classify the infinity of the objects of perception, the next operation of thought is to facilitate the recognition of these types, by assigning to them distinctive marks. Thus is produced the *categorical syllogism*, the first of the third group of syllogisms, and the staple of ordinary logic, with the figure :

G — P — I.

All animals having solid hoofs are of the horse kind—this animal has solid hoofs—therefore it is of the horse kind.

There is no change in this figure from that of the last

extent of motion. For instance, we distinguish trees from shrubs, partly by their size, but principally by the upright mode of growth of the tree, contrasted with the spreading mode of growth of the shrub; a character which reaches its maximum in the grasses, with which, as we say, "the earth is "carpeted." Again, we distinguish one kind of tree or shrub from another, chiefly through the way in which their branches are put together or their leaves set on, coupled with their size. In animals, the idea of the direction of the forces concerned in their formation, merges into that of the forces displayed in their own movements. We distinguish them into flying, walking, running, jumping, swimming, creeping, crawling, or stationary creatures; and within these divisions we make others dependent upon peculiarities in the way of exercising these functions, coupled with the size of the different creatures. Closer observation has led to the discovery of many other particularities in the mode of operation of organised forces, whence we have constructed other groups. But our primary classification remains, the pioneer opening for our thoughts a road into the mysteries of nature. The non-appreciation of the distinction between the summing up of observations expressed in the thought of typical relations, and the necessity disclosed in the attempt to understand these relations by deducing them from the constructions of our own thought, is the great source of the confusion prevalent in regard to the use of induction. Mr. J. S. Mill, for instance, sees in all universal propositions only the condensed statement of single cases; that is, he confuses our *thoughts* with the proof of their *applicability* to explain facts; two things perfectly distinct. That two moving bodies drawn to each other by forces, varying directly as their mass and inversely as the square of the distances between them, will describe conic sections round their common centre of gravity, is a necessity of thought following from the conceptions dealt with. Whether there *are* any such bodies is a judgment of induction, depending on the accumulation of observations. Mr. Davies, who feels the difference between the propositions "that two straight lines cannot enclose a space," and "that snow is always white," naively tells us, that to give to the last the character belonging to the first we must "regard the word snow as connoting white," (*ABC of Thought*, 100). But why we do not so regard it, though all experience lies one way, he does not tell us. He does not perceive that in the one case we are dealing only with the constructions of our own thought, in the other with those constructions applied to give unity to data supplied by sense.

figure of the syllogisms of induction. But thought quietly substitutes new bones beneath the old skin. The categorical syllogism reproduces the third form of the syllogisms of induction, idealized by the introduction of a *necessary* element; but *without expressing the necessity*. For instance, take such a syllogism as the following:

- \wedge *All equilateral triangles have the angles at the base respectively equal to the angle at the summit—All triangles having the angles at the base respectively equal to that at the summit have three equal angles—therefore all equilateral triangles are equiangular.*

We assert here what we know to be necessarily involved in the conception of a triangle. But we state it in the form of a conclusion derived only from induction, through the assumption of some principle of unity which we are not yet able to define. Therefore our conclusion has an inductive character. We are no more justified, logically, in concluding from the judgment "all equilateral triangles are equiangular," that "all equiangular triangles are equilateral," than we are in concluding from the judgment "all men are mortal," that "all mortal creatures are men." The syllogism rests upon an apodeictic judgment, instead of upon that ideal judgment, on which we might expect to find the syllogisms of necessity founded; such a judgment, for instance, as this,

Equilateral triangles are those rectilinear three-sided plane figures which have the angles at the base respectively equal to that at the summit.

Whence would follow, that all such plane rectilinear three-sided figures were equilateral. But the ideal judgment would have been out of its place at this point in the series of syllogisms. The character of the apodeictic judgment exactly answers to the two-fold character of the operation, which closes the syllogisms of induction, and introduces the syllogisms of necessity. For in it two judgments run into one. The first half of such a judgment as "the bridge

is of iron, therefore it is strong," is only *reflective*. It declares iron to be a substance so constituted as to give strength to a bridge, if used for its material. The second half infers from this inductive reflection, that the bridge, having the mark of strength in being made of iron, belongs to the class of strong things. The searching analysis of the syllogistic process, brings to light the Janus-like aspect of the apodeictic judgment.¹

Since, by the process of induction, individuals are thought of as united into classes, and in dealing with a type we deal with all the individuals who fall under it, the categorical syllogism, though, strictly speaking, a process of reasoning from the general to the individual, is applicable to classes of individuals; as in the following example:

*Those who benefit most directly by their work are likely to be the most industrious—journeymen who work by the piece benefit by their work more directly than other journeymen—therefore, etc.*²

But in every case the force of the categorical syllogism lies in the particular limitations of the general thought, through which the individual is referred to the general. Now the thought of a limitation necessarily brings with it that of other opposed limitations. We cannot think of those who benefit most directly by their industry, without distinguishing them from others who do not derive so direct a benefit. Thus we pass from the thought of one type or principle to that of correlated types or principles; and this conception finds its expression in the second form of the syllogisms of necessity—the *hypothetical syllogism*.³

¹ This subject is more fully discussed in Appendix II.

² The instance, with others following, are taken from one of the common editions of Aldrich. For the same reason the 2nd and 3rd figures of the syllogisms of perception may be applied to classes of objects, though originally derived from the study of individuals. Whence, in ordinary logic, they are treated as figures of the categorical syllogism.

³ Sir W. Hamilton calls this the conjunctive syllogism; and appositely, in so far as it necessarily conjoins two propositions in its major premiss. But the name "conjunctive" is more appropriate to the next following syllogism,

If the moon has no atmosphere it cannot have twilight—but the moon has no atmosphere—therefore, etc.

If liberty has a tendency to degenerate into licentiousness, it requires to be checked by wise laws—but liberty has such a tendency—therefore, etc.

This syllogism has the form of the second figure of the syllogism of perception; but, like the categorical, with its terms reversed.

P — I — G.

Now to think of one limitation as implied in another, we must refer both to some common ground manifested in each. In the first of the above examples, for instance, there lies beneath the thought of atmosphere and twilight, that of the refrangibility of light. We assert that if light, on approaching the moon, is not usually modified in a particular way, it cannot be so modified in a certain supposed case as to produce twilight. So, in the second example, the use of the word *degenerate* shows that there is some *genus*, some common thought beneath that of liberty and licentiousness, by which they are connected. The common ground thus implied in the hypothetical syllogism is expressed in the *disjunctive syllogism*, with which it is commonly classed; as in the example:

Bodies are either animal, vegetable, or mineral—gold is neither animal nor vegetable—therefore it is mineral.

The primary form of this syllogism is the third figure of the syllogisms of perception, with the same reversal of the terms as in the two other cases.

I — G — P.

Here we assert the existence of a profound unity, underlying numerous particulars which constitute subordinate unities, and define the immediate object of our thoughts by referring it to one of these sub-types. The process is

which conjoins many parts into one whole; though the usage of language by employing the conjunctions, "either" "or," which at once distinguish the parts and combine them to form its major premiss, give it a disjunctive appearance and name.

negative in its form, but positive in its results. The third figure preserves the transforming power exhibited by it in the syllogisms of induction.

But the disjunctive syllogism admits the other figures also. For instance, the following argument is in the second figure :

*Equine animals are either horses, zebras, quaggas, or asses
—all equine animals have manes—therefore horses, zebras,
quaggas, and asses have manes.*

Or if we put as our major premiss, *all horses, zebras, etc., have manes*, we may obtain a conclusion in the first figure, *therefore all equine animals have manes*. So we may take the parts of a disjunctive judgment in the alternative, as in the sentence :

*Kingly governments are either hereditary or elective—if
they are hereditary they have the advantage of stability
—if they are elective they have the advantage of personal
energy in the monarch—therefore kingly governments
have the advantage either of stability or personal energy.*

Or we may bring out a negative conclusion in the third figure, as :

*Equine animals are either horses, zebras, quaggas, or asses
—this animal is neither horse, etc.—therefore it is not
equine.*

Thus the disjunctive syllogism introduces us into the wide world of thought. It sums up the results of all our special reasonings. By it we pass from single judgments into their combinations. If we confine our studies to the form of thought, we should quit logic for grammar. If we consider their subject matter, we find ourselves in the province of science. Trendelenberg well says, that the strength of thoughts lies in their concatenation. The means of producing this concatenation are furnished by the disjunctive syllogism.¹

¹ To supply this means is, however, not exclusively the province of that syllogism. The sorites fulfils the same office for the categorical syllogism, by

It may be observed that the three groups of syllogisms specially turn upon the three logical figures taken in succession. The syllogisms of perception find their full expression in the first figure, which alone, in this group of syllogisms, yields a positive result. The syllogisms of induction have their pivot in the second figure, to which the syllogism of analogy leads, and on which the syllogism of reflection rests: while the syllogisms of necessity find their complete utterance in the third figure, which discloses the thought of a comprehensive unity where the syllogisms of perception exhibited only separation.

Other curious relations may be detected among these subtle processes of inductive thought; but it will be more instructive briefly to review the series of operations composing them. They begin with the formation of conceptions, through which we grasp together various particulars into individuals by referring them consciously or unconsciously to general thoughts, and are directed to the discovery of these general thoughts. To arrive at this discovery, thought resolves its conceptions into judgments. The study of these judgments discloses in them an order of succession; passing from the judgments of perception, which deal only with the external, by means of the judgments of induction, where an internal element begins to appear beneath this external, to the judgments of necessity, which apply this internal element as the bond between a multitude of indi-

linking together successive limitations of the primitive thought; as in the argument of Cicero's epicurean (*De Nat. Deorum*, sec. 18): "since the gods are most happy; but none can be happy without virtue, nor virtuous without reason: and reason exists only in the human form; therefore the gods must have the form of men." So other forms of syllogism may be expanded into sentences. In the edition of Aldrich cited above, there is a curious instance where an inductive syllogism, founded on a problematic judgment, is confused with a disjunctive syllogism. The sentence is:

Virtues are either faculties, passions, or habits—but virtues are not faculties or passions—therefore they are habits.

The major premiss does not mean to assert that virtues *include* faculties, etc., but that they are *included* under one or the other of these divisions. The object of the minor is to discover, by an exhaustive induction, under which division they fall.

viduals. But, in our judgments, one link of thought is concealed. Each judgment consists of two terms only, while in our conceptions three elements are combined. Therefore the analysis of our judgments introduces us to the syllogism, where these elements are distinguished. Here we learn the grounds of our judgments. Beginning, as before, with those concerning the external world, we find them to be pervaded by the thought of types, that is, of fixed relations subsisting among changeable particulars, through which the infinite variety of the individual is united into classes. In the categorical syllogism these types become defined by some one of their fixed properties, and thus acquire a solidity, such as enables us to take our stand upon the thought of them, and to regard the individual case as a particular limitation of a general conception, instead of seeking for the general conception through the particularities of the individual. Yet at first we approach this operation only from the outside. We think of a multitude of types, and try to combine them into a totality exhaustively, by counting them up. To this unity of classification the disjunctive syllogism brings us. But we cannot stop there. The inductive process necessarily carries our thought to its opposite, to the examination of the fixed relations which we assume to underlie all these related types, with all the infinity of individuals comprehended under them, and to give order to the world of thought.

As a guide in this operation, there remains the last of our judgments, which has not been included in the inductive process, the *ideal judgment*. The examination of this judgment forms the subject of the next chapter, where we shall consider the character of deductive thought.¹

¹ For the relation of the views put forth in this chapter to ordinary logic, see Appendix III.

CHAPTER VII.

Deductive Thought.

THE phenomena of which we are conscious present themselves to our minds at first as an insoluble mystery. In this state thought is *subjective*: it lies bent down beneath the weight of the objects cast upon it. But though prostrate, it is not powerless. Gradually it dissects the mass of phenomena into manageable portions; traces out connexions between them; and penetrates beneath them to principles drawn from itself. To borrow an expressive phrase from a recent writer in the Cornhill Magazine, we learn to "see with our eyes shut."¹ In this condition thought is become *objective* or *deductive*. It turns from that which acts upon it, to that which it deduces from its own action.

This objective character of thought, though it is intimated through the whole series of our judgments, is expressed fully only by the *ideal judgment*, where the predicate defines the subject.² The qualitative judgment, "this rose is red," "this figure is three sided," calls up indeed an ideal rose or triangle before our minds. But our thoughts do not dwell on this ideal object, but rest on its sensible manifestation. We construct an object of thought, because it is the nature of thought to make such

¹ Vol. vi. 64.

² For the distinction of judgments depending upon the definition of the subject by the predicate or the predicate by the subject, see Appendices II. and III.

constructions, but the form of the judgment does not bring this fact to our notice, and we remain unconscious of its true nature. The categorical judgment assumes its conclusions to be necessary, but does not point out the necessity. Even the disjunctive judgment only brings the objects of thought before us as things to be enumerated and classified. But the ideal judgment projects itself before our mental vision as a permanent reality of thought, distinct from, though realized through, objects of perception. For instance, when we define a rectilinear triangle as that plane figure which is formed by the mutual intersection of three straight lines, we obtain a conception realizable in countless different forms, but independent of any of them: a true object of thought, whence we may *deduce* objects of sense. To understand fully the nature of thought we must investigate the nature of this deductive process.

I.—After the analogy of the mental operations previously investigated by us, this operation begins with the relations of coexistence. The objects of thought forming our ideal judgments, if they are conceived to be realized in space, would give rise to a multiplicity of objects of perception, distinct from, and apparently indifferent to, each other; each existing separately in virtue of its specific limitations, yet forming classes standing in relations more or less close to each other. For each of these objects would consist of lines of movement, defined (1) qualitatively, and (2) quantitatively. But the quantitative relation admits of endless variation, while the qualitative relation, which defines the kind of object, may remain unchanged. Thus the same judgment might produce numerous groups of figures; while, by a slight change in the qualitative relations, *e.g.* by the transition from a three sided to a four sided figure, other classes of objects more or less closely connected with the first would be formed. But in all these cases the principle of unity

would be *mechanical*, i.e., it would arise out of visible distinctions, pointing to a bond of union hidden beneath their apparent differences.

Now, the thought of a unity hidden beneath the apparent differences of the objects of perception, carries our thoughts to the consideration of their internal constitution, and thus discloses to us the opposite thought, namely, that each of them presents a visible unity, arising from hidden differences; in other words, that each embodies what in nature we call *chemical* relations. Every triangle, for instance, consists of different lines, varying, if not in length, at least in direction, and producing the triangle through their differences.

Yet if we examine the lines constituting any triangle separately, the relation between them passes again from the chemical to the mechanical phase of thought. Each line exists in itself, independently of any other, from which it is distinguished by its quality and quantity, its direction and length, i.e., by those properties whence the materials for mechanical classifications are derived.

Thus each ideal judgment is a unity of opposite relations mutually passing into each other. And the conception in which they unite is that of the expression of *design*. We bring together the three lines of our triangle, *in order* to produce the triangular figure. The triangle is the *end*, and the lines are the *means* through which we accomplish that end. That they can serve as means for this purpose is due to their mechanical distinctness. That they can rise out of this state of distinctness, into that of union, is due to their chemical combination.

Hence we perceive why we do not find among our ordinary judgments any expressive of that conception of design, by which our own lives are filled and which nature seems to repeat from all sides. In these judgments we pull the constructions of thought to pieces, in order to arrive at their principle of union. But the thought of

design is inherent in the act of construction, and appears only when we contemplate the process of building up the constructions to be analysed.¹

Now this conception of design is quite independent of those notions of utility against which the logical arguments from the design displayed in the universe have so often made shipwreck. It is not because a triangle is useful, that its construction implies design. It may, or may not, be of any use,—or it may be used for some design other than that belonging to its constitution, and this may be subordinate to further designs, in endless succession ; but their existence or non-existence in no way affects the design displayed in the conception of the triangle. And that design is of a high degree, as will appear if we consider the different modifications of the thought of design. The lowest degree of design is a mere blind desire, or tendency to realize an impulse, such as apparently constitutes the vital action of organized bodies. Above this, comes the choice of means for an end determined by an impulse not chosen by the free will of the being who makes the choice. This seems to be the condition of instinct, in many of its higher manifestations. The beaver, for instance, in its native woods exercises remarkable sagacity, in the choice of the site for the dam on which its welfare depends, and

¹ Trendelenberg, in his *Logische Untersuchungen*, ii. 63-83, solves the difficulty here noticed, by saying that our common judgments deal only with the movements whence matter arises ; while the thought of design belongs to the corresponding, though distinct, movement of our spiritual nature. But the explanation implies a duality of character in the two powers, with which it is impossible to be contented. The unmistakable tendency of all speculative thought is to seek for a unity between the outward and the inward : to resolve thought into a consequence of material action, or matter into a form of spiritual activity. It is therefore satisfactory to find that the formation of our ideal judgments involves the production of the two great forms of material action made known to us by the senses, the mechanical and the chemical. The application of teleology to nature seems always to break down when we come to her means ; to those unchanging powers which impose conditions on all her apparent ends. But if, by reasonable analogy, it can be shewn that these elementary powers are themselves penetrated by the thought of design ; that they must be considered as themselves ends, produced by combinations of means, *cadet questio*, the idea triumphs completely.

in collecting and adapting the materials required to form it. But place it in captivity, and it will build a dam in the corner of a room, with chairs and bits of wood, and sit there waiting for the water which never comes. The choice of the end is not left to it: the sphere of activity of its designing faculty is limited to the choice of means. But the design displayed in an ideal judgment includes an end freely chosen, and means suitable to that end suitably combined. Thus in it the objective and the subjective mutually pass into each other. The object loses the substantive character possessed by it in the judgment of perception, by appearing to be only the means of realizing a subjective determination. The subject, in turn, renounces its own independence, by setting the object before itself as the end, in which it is itself realized: yet in this operation, neither side is lost. The object subsists for itself, as the means through which the subjective design is realized. The subject equally subsists as the design to be realized in the object; which may fall very far short of the intention. The conception of whole and parts, outward and inward, reappears, transformed into a more spiritual relation. In the thought of design, not only does the whole merge into the parts, and the parts constitute the whole; not only does the outward repose on the inward, and the inward express itself in the outward; but the inward design determines each of the outward parts, in virtue of their relation to the whole through which the design is expressed. The idea of a triangle is realized in countless distinct objects, of which each has some particular angles, some particular length of its sides. Now each of these special limitations of the general thought implies some special condition of the other limitations. If one angle be fixed, the sum of the other two is thereby determined. If two angles are fixed, the third is fixed also. If a side be added to these angles, the whole triangle is known. Lengthen any side, enlarge or diminish any angle of any

triangle, and you entail the necessity of correlated modifications of the other sides and angles.

II.—The conception of a part whose modification produces correlated changes in the parts associated with it, carries us from the consideration of the relations of co-existence to the relations of succession. Here a new set of conceptions opens before us. To think of an ideal judgment under relations of succession is to think of it under a variety of *conditions* affecting either its internal constitution or its connexion with other judgments. In the study of these varying conditions lies the secret of our knowledge as to the nature of each judgment and its bearings upon similar acts of thought. To turn over a problem in our minds and present it to them under many aspects is the recognized method of understanding how to solve it. In the application of this process to our judgments, a boundless sphere of *knowledge* expands before us.¹

III.—But to avoid losing ourselves in the pursuit of knowledge, we must reconcile the principle of change with the opposite principle of permanence, the thought of succession with that of coexistence. Since each ideal judgment admits of unlimited variations of quantity in its parts, its realization under the relations of succession would involve a constant passage, from one fixed set of quantities to another pressing upon and tending to displace it. If these changing forms were not held fast, the judgment could not be examined at all. Yet that they should be allowed to change is indispensable to their effectual examination. To reconcile these opposing tendencies, we fix certain parts of our judgments, assuming, for instance, that the angles at the base of a triangle are equal, or that one is a right angle, and thus create within each judgment a series of *ideal types*, under whose wings the infinity of possible variations of relation, arising out of its constitutive qualities, may cluster.

So knowledge can grow up. But if we ask what we thus

¹ For further illustrations of this stage of thought, see chap. xiii. § iv.

learn to *know*, the answer must be what we have *willed* to construct in thought.

It may appear at first that this knowledge must be always intuitive; that the will can be known only by itself. But this argument overlooks the fact that, beside the knowledge of *what is willed* stands the knowledge of *its consequences*. We produce a circle or a triangle in thought by the action of our will, but we cannot alter the relations between them when produced. These are, indeed, the necessary consequences of our wills, but constitute a science wholly independent of it.

Hence arises that peculiarity of geometrical reasoning already noticed, namely, that while it rests upon ideal judgments, its conclusions have commonly an inductive form. The ideal judgment produces objects of thought positively defined. All the possibilities of relation, either of their own parts to each other or of these objects to other like objects, are involved in these definitions. But the definitions do not *state* these possibilities. They determine only the general conditions of existence of the objects defined; that is, their qualitative relations. When determinations of quantity are superadded, a variety of particular relations spring up subordinate to the primary qualitative relations, but incapable of being directly determined from the original definitions. Thus our ideal judgments stand over against ourselves as objects of research. We discover their properties as we discover those of natural objects, by a species of divination applied to the results of observation. Hence geometrical demonstrations acquire the accidental character which prevents their producing the impression due to their real certainty. Instead of showing that an equilateral triangle is that kind of triangle which has three equal angles, the geometers content themselves with showing that equilateral triangles are equiangular; and leave to an independent argument the proof, that equiangular triangles are equilateral. And yet

geometrical proof avowedly rests on intuition ; that is, on perceiving the consequences of what we have willed. The fundamental proposition of Euclid, that two triangles which have two sides and the intervening angle equal are equal, is proved by saying, conceive the one to be laid upon the other, and you will see that they must coincide.¹

The same principles pervade all knowledge. In the higher branches of mathematics the process of deduction is so wrapped up in operations conducted by symbols, that we lose sight of its intuitive character. Yet what can be more intuitively true, than the fundamental propositions relating to equations ; (1) that if x be equal to y , this equality cannot be affected by any process affecting x and y alike ; (2) that of two different expressions for the same quantity, one may be substituted for the other. Thus mathematical analysis testifies most clearly to the important truth that *science, at bottom, is only the intuition of will*. The mathematician derives the conditions of his equation from some ideal judgment, some conception formed by an act of his will. These conditions present themselves to him as a problem. He endeavors to ascertain what is

¹ From not sufficiently considering this characteristic of their proofs, and from a laudable dread of multiplying axioms needlessly, geometers sometimes confuse the mind of the student by laboriously proving that which is evident ; as, for instance, that all the angles made by any number of lines meeting at a point on the same side of a straight line, are equal to two right angles. Draw the lines and the equality is apparent. The proof given resolves itself into the intuition that the lesser angle is contained in the greater. In general, methods of construction are not sufficiently distinguished in Euclid from the problems demonstrating the properties of the figures constructed ; and, partly from this cause, there is a want of logical connexion in the succession of problems. For instance, the properties of angles are dealt with after many of the properties of triangles, and the general property of a triangle, that its three angles are equal to two right angles, follows the problems relating to certain specific kinds of triangles ; though a natural classification passes from the general to the particular, and thence to the individual. And yet if the axiom, that a straight line falling on two parallel straight lines makes the same angles with each, be substituted for Euclid's 11th axiom, which certainly is in no degree more self-evident, this property of triangles might be one of the first demonstrated. See Appendix I. on the proposed substitution. Some excellent observations will be found in Trendelenberg's *Logische Untersuchungen*, ii., 290-295, on the possibility and utility of exhibiting geometrical proofs in a connexion such as to follow the natural order of thought.

implied in them. The solution of this question may bring out results which he did not foresee, or foresaw very imperfectly. Yet these results are parts of the original equation. They are only the effect of what he willed—made patent to his thoughts.

The knowledge derived from the data accumulated by sense may at first sight seem to stand upon an opposite ground, because its true character is apt to be concealed beneath the inductive process through which it is obtained. The phenomena come first; the interpretation follows. Yet what are the phenomena without the interpretation? And whence is the interpretation derived but from the study of the thoughts constructed by our own minds? The elliptical orbit of the planet has no existence, except in the thoughts of the astronomer, who sees in it the limit about which the actual movements of the planets oscillate. So Newton came to a result quite unexpected by him, when he studied the path which a moving body urged continually to a fixed centre, by a force varying inversely as the square of the distance, would describe. He wanted to show that it must be an ellipse, and found that it might be any conic section, and thus explained the paths of the comets without intending it. How much more indeed than he imagined did not his conception of the action of gravitation contain! It has accounted for the form of the earth, the other planets, and the sun; the movements of the tides; the perturbing action of the planets upon each other. It has disclosed the respective weights of sun and planets. It has even revealed the existence and position of a planet unknown to observation. Yet all this has grown out of the conception that bodies might attract each other, directly as their masses, and inversely as the squares of their distances.

And as the end so is the beginning. Our conceptions of the objects of sense appear at first to be fetters on our will, imposing upon us a necessity of conforming our

thoughts to them. But this is not the case. We sit constantly in judgment on the instinctive assertions of our consciousness, affirming or rejecting them; as is most emphatically shown in regard to the whole mass of the impressions of sense, when we assert that the sun and stars do not move, though they appear to be moving, and that all the objects around us, together with ourselves, are in continual and very rapid movement, though appearing to be stationary.

The difficulty which may be felt in the position that all our knowledge is the knowledge of our own will, arises from not sufficiently distinguishing our perceptions and the conceptions instinctively founded upon them, from our judgments. To the question whether our *perceptions* depend upon our will, there is but one reasonable answer: they do not. They are external to our will. They act upon it, and are not produced by it. Again, these perceptions give rise to conceptions, which, though produced by the constructive activity of thought, derive their materials from the action of the senses, and owe their particularities to the particularities of the objects whence they are derived. Here we have undoubtedly the elements of knowledge, but we have no knowledge of anything, beyond the fact that there is a something to be known. Our knowledge of the nature of that something depends upon our power of transforming these instinctive acts of thought into conscious acts, and thus accounting for the order of natural phenomena. And this transformation we effect through our judgments; which, by criticizing the constructions spontaneously formed by thought from observation, give liberty to the imagination to reconstruct them. The constructive activity of our thoughts is perpetually set in motion by our senses, as it is enlightened by communicated thoughts. But for any available results of that movement it is indebted solely to itself.

Thus in the world of science the opposites of *willing* and

knowing pass into each other. The will originates knowledge as the condition of exercising itself; and it carries into its *practical* dealing, with the world of sense, the principles through which it produces the world of *theory*. It is always bent on realizing itself in the objects about it, and moulding them after its own designs. In this effort it assumes these objects to be, like the objects constituted directly by its own action, unsubstantial and changeable in themselves, deriving their reality only from their capability of expressing the true reality, namely, its own subjective desires. It treats them as a world of *means*, essentially subordinate to the world of *ends*. And yet, as we have seen, these ends are realizable only through the production of an endless series of objects. Each ideal judgment includes an infinity of distinct phases, constituting altogether the means of its realization. It seems, then, to be the nature of our will never entirely to realize itself. Indeed, if it could do so, its activity must cease. There would be nothing left for it to do. For its own preservation, therefore, the human will requires that performance should never absolutely overtake desire. Yet the chase is not fruitless. The *ought* of the will, the longing after perfection, springs from the pursuit. It is no fixed attainment, but a principle of which the vitality depends on a perpetual effort to realize itself. The practical will recognises the objects with which it deals as distinct from itself, and lives in the struggle to bring these objects into unity with its own desires. So that it may be defined to be a principle ever engaged in realising its own subjectivity by means of a something set over against itself, but in which it recognises its own reflection.

Thus the practical and the theoretical will exhibit a similar action in opposite directions. The study of the object of knowledge leads us to the will as its origin; and the study of the will leads us back to this object as the means of its realization. Each of these fundamental op-

posites seeks to realize itself in the other. Our studies and our action alike commence by distinguishing ourselves from a world of objects opposed to ourselves, and consist in overcoming the difference between this world and ourselves, by tracing our own thoughts and realizing our own wills in it. The phenomena of human reason in both its aspects, as knowledge and as will, lead us to the conclusion that the *action of thought consists in producing a unity of subject and object through a perpetual process, wherein the subject continually distinguishes itself from itself to form its own object, setting itself over against itself as the other of itself, in order to use this other as the means of its own realization.* This is the *Law of Thought*. It is what Hegel calls the absolute idea; the idea in, and for itself; the *νόησις νοήσους* of Aristotle.¹ We proceed to enquire how far the

¹ See Metaph. xi. 9; Greater Eth. ii. 13. His definition, however excellent as a statement of what thought, *ἐνός*, is in its essence, is, however, defective as an explanation of its action, in not showing how a power constituted as A. supposes, could act at all. Aristotle expressly excludes movement from his *ἀρχή*. It produces movement, he says, without moving, because it is the object of perception and desire to all other beings. For *τὸ ὑπεκρὶν καὶ τὸ νοήσας, κινεῖ δὲ κινουμένον* (Metaph. xi. 9). But whence comes the *ὑπεκρὶν* and *νόησις* of these beings? Aristotle gives no answer. He takes their existence, with their perceptive and desiring faculties, for granted. Now an *ἀρχή*, whence the *φαινόμενα* cannot be deduced, is no true *ἀρχή*. Aristotle's explanation is therefore insufficient. Yet his arguments (Metaph. xi. 7) to show that the first principle of the universe must be unchangeable, are unanswerable. The way out of this difficulty lies in that Platonic doctrine of ideas, to which Aristotle "bade farewell." The ideal judgment perfectly reconciles the changeable *φαινόμενον* with the unchangeable *ἀρχή*. *E.g.* The conception of a triangle, as the plane figure formed by the mutual intersection of three straight lines, applies without change to an infinity of triangles, and applies fully to each. If, then, the constructive power of the *ἀρχή* acts by the formation of ideal judgments, it may be essentially unchangeable in its mode of action, while yet this action will produce constant change.

Some surprise may perhaps be felt that, in the preceding investigation of the law of thought, no mention is made of that distinction between the *reason* and the *understanding*, on which so much stress has been laid since the time of Kant. But, when the supposed intuitions of the reason are shown to be only different stages of the universal action of thought after its law, the ground for this distinction disappears. The faculties thus distinguished are really only the opposite phases of the mental operations of construction and criticism. The constructive, imaginative, poetical action of thought, the tendency to go forth out of itself, is the faculty which has been called the *reason*. The analyzing, critical, reflective action, where the mind turns back on itself to examine its own constructions, is the faculty which has been called the *under-*

knowledge of this law may enable us to answer the questions which led to the present investigation.

standing. In most minds a tendency to the one or the other kind of action predominates. Not often do men arise as careful in criticising as they are fertile in producing, or the converse. But there is no sufficient ground for assigning these actions to distinct faculties of thought, or for supposing that the mind has an intuition of anything, except its own action.

We add a few remarks explanatory of the use made in this work of the words *subjective* and *objective*. These words, as commonly employed, have two senses. *Primarily*, they denote the thinker,—and that of which he thinks, though this meaning is often confused from the tendency of the opposites of thought to pass into each other, whence we call that of which we think, indifferently, the subject or the object of our thoughts. *Secondarily*, they denote a something unreal and changeable,—and a something real and unchangeable. Now this secondary sense expresses an important fact (noticed in p. 76), namely, that thought begins with the perception of that of which it thinks, as an incomprehensible something, beneath which it *lies*, and that it gradually raises itself up till it can *stand* under this burden, and deal with it freely. On this fact, generally overlooked by metaphysicians, though instinctively intimated by the usage of language, we have insisted in the passage referred to above, and have accordingly applied the epithets subjective and objective to denote these stages of thought, and by implication, to the systems of philosophy which, as will be shown, represent them in history; and that without regard to their subject matter. Thus the pre-Socratic schools of philosophy are to us subjective, and the post-Socratic objective, though the first were busied mainly with the outer world, and the second mainly with our inner world; because, in the first case, thought was only *feeling* its way to the comprehension of its subject matter, while, in the second case, it took its stand firmly on its own conceptions, and *deduced* its results with logical precision from them. To the writers who classify philosophies, not according to the operations of thought manifested in them, but according to their subject matter, the pre-Socratic schools are, on the contrary, objective, and the post-Socratic, subjective. On the other hand, when we have had occasion to speak of the difference between the thinker and that of which he thinks, we have used subjective and objective in their primary sense, to denote this difference.

PART II.

THE HISTORY OF THOUGHT.

Each by turns was guide to each ;
And Fancy light from Fancy caught ;
And Thought leapt out to wed with Thought.



CHAPTER VIII.

Ancient Philosophy.

WE have now followed the course of thought, from the stage where we contemplate it as a bare faculty of construction, through all the phases marking the action of such a faculty, till we arrived at an expression for that action, comprising all these characteristic operations, and therefore constituting the statement of the law of thought. This investigation concerns the power of which we are personally conscious. But if we are right in concluding that there is such a law of thought as we have asserted, naturally giving rise to such a series of thoughts as we have traced, it would seem that this law ought to make itself visible in the succession of those great systems of philosophy by which men have attempted to explain existence. For, however multifarious the subjects comprised in these systems may be, they have undoubtedly been pervaded by leading thoughts or principles ; and although it cannot be assumed that these thoughts must occur to men historically in what may be their logical order, still, if there is a natural order of thought, as we have asserted, there must be a greater probability in favor of thoughts actually occurring in this order than in any other. We propose, therefore, to test the truth of our theory, by comparing the succession of thoughts indicated by it with that appearing in the history of philosophy.

To do this in respect to any besides the most prominent systems would indeed be impossible within our proposed limits. Nor in respect to these can we do more than indi-

cate the governing thought of each. Nor do we purpose to include the philosophies of the East, where the development of thought has been stunted by the feebleness of the sense of individuality. Our inquiry will commence with the commencement of Greek philosophy,—the school of Ionia; and here we find ourselves on the now familiar track.¹

I.—It commenced by seeking for some permanent *being* beneath the endless varieties of appearance, and placed this being, (1) in the principle of motion; (2) in the distinction of this principle into opposites of movement and repose. From these conceptions arose the celebrated school illustrated by Thales, Anaximander, and Anaximines.²

The principle of movement *Thales* identified with water.³ *Anaximander* referred it to an infinite force called by him *to apeiron*, whence the opposition of moist and dry, cold and hot, arose. *Anaximines* referred this infinite force to the all-pervading air, and resolved the opposites produced by it into consequences of condensation and rarefaction, whence

¹ The authorities for the statements made in the course of this sketch are drawn, for the most part, from the Rev. F. D. Maurice's very able and interesting work on Moral and Metaphysical Philosophy,—a work unequalled, so far as our researches have extended, in the delineation of the *principles* of each philosophy; the dominant idea and object of the author, in which the true interest of each system lies. At the same time, Mr. Maurice is a most impartial witness for the connexion between the different systems indicated here, because he contemplates their growth from an entirely different side, namely, from the peculiar characters of the men who formed them, and the special circumstances and tendencies of the ages when they were formed.

² For what is ascertainable about the history of these and other primitive heroes of philosophy, see the excellent Philosophie der Griechen, by Dr. E. Zeller, 2nd edition, 1866, vol. i., where will be found our authority for separating Heraclitus from the earlier Ionian philosophers; and generally for the positions here assigned to the schools of the anti-Socratic period. Whatever uncertainty attends the exact times of the births and deaths of Thales and his immediate followers, it seems clear that their activity falls between the years 600-500 B.C., and that they succeeded each other in the order given above.

³ Why Thales fixed upon water as the source of all being we do not know. That it was as the embodiment of movement is probable, from the fact (1) that Anaximander undoubtedly placed the ground of existence in a principle of motion; (2) that Thales, according to Aristotle, ascribed a soul to the magnet, because it *moves* iron; whence A. infers *κινητικὸν τι τὴν ψυχὴν ὀλοαβεῖν*. De An. i. 2. 405, a. 19. Zeller, i. 153. See also Physics, i. 2, l. 4.

all, the varieties of existence were derived by a gradation of more or less, *i.e.*, by differences of quantity.

II.—But the thought of a connexion between quantities carries us beyond the simple conception of *being* into the next sphere of thought to the conception of *relation*, by means of the notions of *proportion* or *measure*. Accordingly these form the basis of the philosophy of Pythagoras,¹ who resolved the formative principle of the universe into number. His successors developed the deeper mysteries concealed beneath the conception of relation. Its investigation naturally conducts us, as we have seen, to consider, 1st, the relations of objects contemplated as coexisting in space, involving the thoughts of identity and difference, form and matter, the whole and its parts, the outward and the inward; 2nd, the relations of objects contemplated as conditioning each other in time, involving the thoughts of necessity, substance, and cause. Greek thought followed this order. The question, whether the principle of existence was single or manifold, formed the ground of division between the rival schools (1) of *Elea*,² which, maintaining the unity of all existence, denied reality to the variety of appearances; (2) of the *Atomists*³ who conceived the appearances of things to be derived from the relations of atoms, that is, from primitive elements essentially different: a difference limited, however, to their *form*,—their *matter* being supposed in all cases the same.⁴ The discussion thus called forth introduced the deeper questions of the possibility and conditions of movement and change; and the answer to these questions gave rise to the systems of Heraclitus, Empedocles, and Anaxagoras. (3) *Heraclitus*⁵ held the principle of existence to be one, namely, the substance manifest as

¹ Probable death, 510 B.C. Zeller, 217. B.C. 472, Clinton, F. H.

² Whose most famous supporters were *Xenophanes*, fl. in second half of 6th century; Zeller, 379; *Parmenides*, fl. 504 B.C., Ib. 396; and *Zeno*, fl. about the middle of the 5th century, Ib. 420.

³ *Leucippus*, fl. about 450 B.C.; Zeller, 575; and *Democritus*, fl. about 420 B.C. Ib. 579.

⁴ Zeller, i. 588.

⁵ Fl. in first half of 5th century B.C.

fire, of which the nature consisted in the perpetual evolution of opposites perpetually passing into each other, heat giving rise to cold, wet to dry, etc. (4) But was such a passage conceivable? *Empedocles*¹ denied it. The elemental substances of the universe he held, with the Eleatics, to be unchangeable, but to be more than one; and the varieties of existence to be due to the varying relations resulting from their difference or harmony. Thus arose his conception of four elements—earth, water, air, and fire; united or separated by two all-pervading principles of love and hate. (5) In such a system, however, the elements moved must necessarily be less important than the principles of motion. Accordingly, the loves and hates of the Empedoclean *substances*, led *Anaxagoras*² to the opposite conception,—that the universe arises from the action of a *nous*, a principle of *causation* and order, which, by uniting and separating the boundless primitive matter, gives rise to the manifold forms of nature; retaining, amid every change, that passionless calm which he delighted to contemplate in the stars, “his true country,” as he used to say.³

III.—Thus Greek thought had investigated the conceptions of being and relation, and in the notion of a constant succession of causes and effects had produced a substitute for that conception of individual action to which religious feeling clings. It was not without ground, therefore, that *Anaxagoras* was specially accused of teaching atheism, though at first sight the charge might seem

¹ 492–432 B.C. Zeller, i. 501.

² Banished from Athens just before Peloponnesian war, B.C. 431. Zeller 665.

³ The historical order of thought among these Greek schools seems to have been as follows: (1) The conception of identity under the opposed forms of—1. The denial of motion; 2. The assertion of motion as continuous. (2) The conception of difference under the opposed conceptions—1. Of the accidental arrangement of atoms; 2. Of their orderly consecutive arrangement. That a perfect correspondence between the historical succession of philosophical systems and the logical order of the thoughts predominant in them cannot reasonably be demanded, has been intimated above. In this case, however, the deviation is so slight, that it becomes quite unimportant.

better to belong to his predecessors. Their philosophies might be considered to be only attempts to explain the means through which the Divine will produced the universe. He seemed to have called up a rival impersonal Deity, who must swallow up the personal gods of the popular faith.

But the principle of *individuality* had a claim on thought not less than on feeling. Its turn had arrived. Its influence may be traced in the tendency of the *Sophists* to deny reality to knowledge, and resolve truth into the fluctuating conclusions of personal opinion;¹ but in the hands of *Socrates*² it became the starting point of a new era in philosophical inquiry. With the thought of individuality we plunge into our own consciousness. The universe seems to vanish as an object of investigation, and the inner world of man to take its place: and this world is to the thinker a world of *conceptions*. Hence we can explain the peculiarities in the teaching of Socrates: his doctrine that the true object of study for man is himself; his demand that "all knowledge and moral action should spring from distinct thought;"³ his desire to act as "midwife" to the thoughts of his disciples; his efforts to hunt out the mysteries of words by precise definitions. If the union of immense intellectual power with the absence of the disposition to make systems, was a specialty of the man,⁴ it made him a true exponent of the stage of thought belonging to his age.

Now, as we have seen, our conceptions pass through two opposite phases: (1) the phase of intuition, expressed by our judgments; (2) the phase of proof, expressed in syllogistic reasoning. These phases duly succeeded each other in Greek thought, each falling to the lot of a mind of the

¹ Zeller, i. 118.

² 468-400 B.C.

³ Zeller, i. 119.

⁴ As Mr. Maurice appears to think, M. and M. P., i. 112-118. As to the fundamental principle of his philosophy, see p. 112, § 2.

highest intellectual order, and naturally adapted to the task assigned it.

1. The objects of our judgments are, as has been shown, unities of parts mutually distinguished from each other, and yet passing into each other. We cannot fix them permanently in any one position. They change as we examine them; but beneath their changes disclose the conception of unchangeable types, producing fixed relations among their ever-varying individualities. These types are the ideas of *Plato*.¹ On these he seized with the intuitive grasp of his poetic, yet analysing genius. He divined their presence exerywhere in nature, as he felt it everywhere in his own consciousness; in the sense of beauty, harmony, truth, justice, and goodness; and it was the object of his dialectics to disentangle the opposite elements whose existence he detected in them all.

2. That he should succeed in the task of reproducing these eternal ideas, in their comprehensive clearness, was impossible. Ages had to elapse before the laborious operations of thought could even draw near that distant goal, to which the genius of Plato soared. His failure stimulated *Aristotle*,² to whose enormous knowledge and astonishing powers of classification, the want of precision in referring details to their proper places was intolerable, to undertake the gigantic task of attaining to truth by defining the whole subject matter of knowledge, and ascending to the universal from the study of the individual.

In this search after the proof of our judgments, Aristotle discovered the syllogistic process; in which, however, he saw, not what it really is, the road to the ideal judgment, but a substitute for such judgments. So that he stopped where the syllogistic series ends, at the disjunctive syllogism, or the thought of classification. In the formative principle of the universe he perceived an energy (*ἐνεργεία*), standing in infinitely diversified relations to a

¹ B.C. 430-348.

² B.C. 384-322.

capacity (*δύναμις*), which constitutes the matter (*ὕλη*) of infinitely diversified forms (*εἶδη*). He discerned among these, resemblances and differences, through which they could be brought under certain types of classification. But the conception of internal constitutive principles whence these types should originate, seemed to him excluded by the nature of the process of reasoning. All judgments, he argues, must be either syllogisms, that is, conclusions resting on other judgments, or judgments resting on themselves. Now these latter are the observed facts: the former are a chain of reasoning dependent on the first principle. Therefore the ideas introduced by Plato between the all-embracing Divine Being, and its manifestation in the individual, must be unreal. So then *χαίρετωσαν ἰδέαι*.¹

IV.—The age of Aristotle has been truly said to close the period when the ideal element of thought, the striving after perfection in every branch of human activity, was dominant in Greece. Nevertheless, the two great schools, which divided philosophic speculations in the interval between Alexander and the Cæsars, the schools of Epicurus and Zeno, rested on ideal judgments, applied to solve those subjective questions to which Socrates had turned men's attention, and for the precise treatment of which Plato and Aristotle had prepared the way. And they exhibit the objective character proper to this stage of thought, under the opposite aspects which we have seen to belong to it, and have called the mechanical and the chemical.²

To *Epicurus*³ the fundamental principle of the universe was movement, without any abiding repose. He resolved it into the casual combination of atoms, and regarded the

¹ Farewell ideas; a sentiment echoed by Sir W. Hamilton, *Discussions*, 69.

² The Peripatetics were little more than commentators on Aristotle, and the Academy ended in its self-lauded *σκέψις*, the seesaw between conflicting opinions. Neither school materially influenced the stream of thought, though they swayed the views of particular thinkers.

³ B.C. 342-370.

human intellect as only an aggregation of the most subtle, with the faculty of reflecting all the rest. Hence the rule of conduct for each individual was to take care of himself. Since the universe consisted of distinct individualities, connected accidentally, the true wisdom for each one lay in discovering the desires of his individual nature, and the best means of satisfying them, and of avoiding whatever disturbed that satisfaction, whether of mind or body. The philosophy of Epicurus is one of *mechanical* relations; of objects thought of as standing only in an external connexion; and he rested it upon an appeal to the external world, deducing his doctrine with logical strictness from physical suppositions, whose clearness and precision is assigned as the cause of the little change introduced into his system by his disciples: a result naturally accompanying the simplicity of mechanical conceptions.

V.—*Zeno*¹ and his followers sought the principle of the universe in the opposite thought—the repose of perfect order; the conception of an intimate union pervading all objects, to which their different properties were subservient as means; in other words, in the conception of the universe as a system of *chemical* relations. Hence the true principle of human conduct, the life according to nature, consisted in the entire subjugation of sense to rule, which it was the business of logic to deduce from the truths of physics, and unfold as the truths of morals.²

VI.—That stoicism should degenerate, under the action of the subtle Greek intellect, into a pedantic multiplication of rules for “living according to nature,” is not surprising. The practical training of the Roman patrician, who had to snatch a moment for philosophical inquiry, in the “Library of Lucullus,” or the “Gardens of Tusculum,” from the business of the senate or the forum, was the best corrective for

¹ d. B. C. 263; *Cleanthes*, b. B. C. 300; and *Chrysippus*, b. B. C. 280.

² Therefore logic was called the *shell* of the system, which held together the *white* (ethics, the practical rule of human conduct), and the *yolk* (the doctrine of nature), whose savor was the great inducement to swallow the white.

such a tendency. But when we meet stoicism in the works of Epictetus and Marcus Aurelius, we find a remarkable change, for which this political training does not account. Their writings are full of a profoundly personal conception of the Divinity. Jupiter is no longer only a name for an all-pervading power, manifested in nature and in man.¹ To the slave *Epictetus* he has become a Divine presence, who "associated with all who used the images of outward things in faith, modesty, and sobriety;" in whose company he felt truly free; superior to Nero, "the slave to his own passions amid his golden halls."² To *Marcus Aurelius* "the universe is guided by a directing reason, easy to be entreated, and flexible; free from all malice; the source of order, unity, and providence; in which we may feel confidence, putting ourselves in order."³

How came the slave to seek for freedom, and the emperor for self-government in the same thought; the belief in a power without themselves, yet able and willing to sympathize with and guide them? The answer is supplied by the law of thought. The opposite doctrines of epicureism and stoicism, the *mechanical* and *chemical conceptions* of the universe, had united in a *teleological conception* of it. To the epicurean the individual was all-in-all. To the Greek stoic the individual was lost in the universal, in the principle of unity. Roman energy placed the individual, in strong self-reliance, as a counterpoise to the universe. In Horace's definition of the "justum et tenacem propositi virum"⁴ the union of the two modes of thought takes place before our eyes:

"Si fractus illabatur orbis
Impavidum ferient ruine."⁵

The pleasant boon companion, the epicurean *Horace*, is

¹ As in the hymn of Cleanthes.

² Fl. A.D. 90. See Maurice, M. and M. P. ii. 31-36.

³ Began to reign A.D. 161.

⁴ The just and firmly-minded man.

⁵ Standing fearless, though the world
Be in fragments round him hurled.

struck by the majesty of a self-reposing power ; that is, of an individuality which nothing can disturb. Stoicism took into itself the principle of epicureism, which came to meet it from the opposite camp ; and the conflicting forms of thought were reconciled by a return to the ancient faith, that the gods were conscious beings interested in the welfare of mankind ; but a faith purified and enlarged by all the intermediate research into the nature of the universe and of man.¹

VII.—*Plutarch*² is an independent and important witness to this tendency of philosophy and piety to join hands. With it arose a new set of questions. If God taught the wise, how came they to differ ? The first answer was the natural one, to deny the difference. Thus Plutarch attempts to explain Plato and Aristotle into agreement. But, in the century following Marcus Aurelius, a profounder conception dawned upon the founders of *Neo-Platonism* ; namely, that knowledge rests on a fundamental *opposition of subject and object*, which it is the true end of philosophy to reconcile. The difference between the great thinkers of antiquity thus became intelligible. Aristotle and Plato had indeed seen the same thing, but from opposite sides. Aristotle approaching the Divine from the side of plurality, had attained only to the conception of a *nous*, which perceived itself ; while Plato had reached the vision of the Divine unity, the eternal idea where the contraries of knowledge meet, and whence the diversities of existence proceed.

VIII.—Thus, in the advance of thought, the distinction of subjective and objective as the opposite phases of knowledge, became the guiding principle of philosophy. But Neo-Platonism could not stop here. It had recognized a Divine teaching as the inheritance of the wise in all ages

¹ An interesting account of the strong religious feeling which grew up at Rome in the first Christian century, is given in M. Nicolas' *Essais de Philosophie et d'Histoire Religieuse*, Paris, 1863, p. 107–164.

² Fl. A.D. 97.

and countries. *Plotinus*¹ endeavours to illustrate this position from the works attributed to Pythagoras, Orpheus, Zoroaster, Horus, etc. Yet it still looked with suspicion on the priest. *Porphry*² boldly questioned all the supposed methods of drawing near to God, otherwise than through the gates of thought. But the *will* plays a part in the world no less important than that of the intellect. If the teacher who addressed the faculty of thought was divinely enlightened, how could the like illumination have been denied to those by whom the character of nations had been formed? Philosophy claimed to lead men to the vision of God. But might not that vision be attained also by the devout worshipper who, under the guidance of the true priest, used the offerings and solemn rites of outward worship, as a means of disciplining his will, to prepare it for union with the perfect Good? Such substantially was the answer of *Jamblichus*³ to the doubts of Porphry; and Philosophy accepted it. To *Proclus*,⁴ whom M. Cousin has called *the* Greek philosopher, the man who summed up the results of all past thinking, the philosopher "is the priest of the universe," whose duty it is to interpret the venerable traditions, through which the gods had of old revealed themselves to man, and point out the accordance of this revelation with the teachings of the great thinkers, through whom in later times the Divine Being had more fully declared its essence to be "a triad of goodness, wisdom, and beauty, which shines forth in the unspeakable order of the gods, as faith that establisheth all things in the good; truth that unfoldeth all knowledge in any being; and love that draweth all things to the nature of the gods," in each of whom this triad was specially manifested in union with their idiosyncrasy.⁵

With this step Greek philosophy had concluded its

¹ A.D. 200-270.

² A.D. 303.

³ The reputed author of the work on the Mysteries. Fl. A.D. 321

⁴ A.D. 413-485.

⁵ See Maurice, M. and M. P., ii. 123-125.

course. There remained nothing before it on the path it had followed, except the application of its doctrines to the moral regeneration of mankind, and for this object it was quite unfit. Theoretically it was at the goal. It had taken into itself the old mythology, by distinguishing itself from which it had begun. One revolution of thought, one great year of philosophic speculation was complete; and the outward course of events seemed to move in accordance with this inward movement. Proclus is historically the last of the great Greek philosophers. Within fifty years after his death his school was closed by the edict of Justinian;¹ and while it continued his followers had only trodden with unequal strides in his footsteps. Through him ancient philosophy had spoken her last word. An epoch of intellectual darkness followed. When the dawn of speculative thought reappeared it rose upon a new world.

¹ A.D. 529.

CHAPTER IX.

Modern Philosophy.

WHEN the Greek thinker asked his own mind for an account of the universe, other than that presented by the myths and traditions of his forefathers, he had before him an untrodden field of speculative research ; and in the artistic or poetical creations of his imaginative countrymen, much to stimulate curiosity but little to satisfy thought. He turned with eager inquiry to the wonderful nature around him. Its order and its changes ; its great opposites ; its apparent unity, gave the first direction to his meditations. He began by speculating on what gave being to this sensible world, on the principle of permanence beneath its manifold varieties of change. From this thought of the being of the world, he proceeded to those of the relations of its parts ; their unity and diversity ; their succession and causation ; and passing thence to the thought in which being and relation unite, the conception of individuality, developed this conception through all its stages, till he saw in the universe the manifestation of a Divine power, from whom the one and the many, the universal and the individual, flowed, and in whom they were reconciled.

The thought of modern Europe began with this conception, only in the form, not of a philosophical truth resting on the study of nature in the world and in man, but of a religious dogma. Nature might indeed move the curiosity of the Christian thinker in the age of Gregory I. and his successors, but could not seriously awaken his interest.

Did he not know that God had called up the world from nothing in six days' work, and would ere long sweep it away? Was it not a fallen degraded world? Was not the power over it committed to the saints, by whose prayers and commands its elements were swayed? But alongside of these shows of sense lay a spiritual world, well worthy of the deepest attention; and with it he was brought into communication through the mystical body of the faithful in the church. Her venerable rites therefore, her sacred histories, her profound dogmas, her holy mysteries, her mighty powers, her glorious privileges, her hierarchy of saints and angels: these were phenomena on whose being and relations human thought might fitly dwell, reverently applying in explanatory statement, or confirmatory proof, or deductive application, the instrument of research handed down by the fathers; that is to say, the system of logic elaborated by *Boethius*¹ for the use of the West on its separation from the Eastern empire, in connexion with some of the doctrines of the later Platonists.

I.—Accordingly, from *Boethius* to *St. Anselm*² the thought of a spiritual *Being* present in the church, and of words as denoting realities arising from the action of this Being, made itself heard through these "ages of faith," amid the furious passions and wild turmoil of the convulsions attendant on the birth of our European world, and laid the foundation for its future civilization.³ The practical efforts, the religious tendencies, and the philosophical

¹ d. 526.

² 1035-1109. Maurice, M. and M. P., iii., 37.

³ That the mediæval thinker should attribute reality to words was a necessary result of his looking to them as the exponent of infallible truths. But other circumstances combined to produce this effect. In ancient thought generally, a far greater weight was attached to words than can be assigned to them in modern notions, after the overthrow of all our natural conceptions, by the progress of science. Further, the legal training of *Boethius*, from whom the philosophical thought of the West took its tone, led him to regard the words employed in his philosophical distinctions, with almost as much respect as if they had figured in a rescript of the emperor (Maurice, M. and M. P., ii. 13). So that the philosophical education of those ages, precisely accorded with their theological bias.

speculations of the epoch, alike bear this mark. We see it in the attempts of Charlemagne to extend the supremacy of Christ's kingdom over the Saxon nations by the sword; in his reverence for the Pope as the visible representative of this spiritual Presence; and his anxiety to form a learned clergy by the schools of which *Alcuin* was the head.¹ We see it towards the close of the epoch in the enthusiasm which, at the voice of Urban II., hurled Europe upon Asia to recover the holy sepulchre from the Turkish sway. It appears in the assertion of the Divine governing will, the kingdom of Christ supreme over all earthly sovereignties, made by Gregory the Great, and constituting the basis of the claims set up by his successors.² It was the foundation of the scholastic conception of teaching, as a training of the spiritual soldier to fight God's battle with words.³ It is at the bottom of the controversies as to the real presence of Christ in the eucharist;⁴ and of the theory of Anselm, which attributes to the death of Christ an absolute effect in satisfying the justice of God, distinct from its relative effect as the ground of human trust. And it animates the profound system wherein *John Erigena* exhibits all creation as an action turning on the incarnation of Christ;⁵ no less than Anselm's bold attempt to establish the existence of an all-perfect Being from the conception of his perfections.⁶

II.—1. But the mind, as we have seen, creates for itself the necessities it assumes. With the gradual development of a class to whom knowledge became a principal instead of a secondary object,⁷ came the question what those words by which the battles of the church were to be fought really meant, and whence they were derived. Thus arose the first school of *nominalists*. What, asked *Roscellin*,⁸ is the unity attributed by us to a family, or a nation, or the Persons of the Trinity, but a relation assigned by our thought

¹ 736-804. Maurice, M. and M. P. 39.

² *Ib.* 32.

³ *Ib.* 34, 35.

⁴ *Ib.* 42, 43, 89.

⁵ *Ib.* 45-83.

⁶ *Ib.* 98-104.

⁷ *Ib.*, 114.

⁸ Condemned at Soissons 1092.

to objects in themselves distinct.¹ If there is a universal man, argued *Abelard*,² essentially present in each man, then, wherever a man is present, Socrates and Plato must be present, and there must be a universal animal at once rational and irrational, etc.³ Yet if each man be regarded as having nothing in him but what is proper to himself, the fact of the universality attributed to the name man is unexplained.⁴ Again, if you treat genus and species as only different names for individual things, it may with equal force be contended that there is nothing but the universal. There must, therefore, he concluded, be a human matter in each man capable of different forms; as, again, in each animal, there must be an animal matter capable of diversity of form in different kinds of animals; and so on, till we arrive at the thought of a pure essence susceptible of taking the contrary forms of body and spirit.

2. That this doctrine, which rested the foundations of knowledge upon the *relations of coexistence* subsisting between individual sensible objects, should call forth the energetic opposition of all who, like St. Bernard, felt that beneath the sensible form there was a spiritual reality, though they might not be able logically to show how it acted, was inevitable. The effect of the nominalist disputes was, therefore, to call forth a profounder aspiration after spiritual life, and more earnest efforts to educe its depth of meaning in an intelligible form. Hence the distinction between signs and things, dwelt upon by *Hugo de St. Victoire*,⁵ and *Petrus Lombardus*;⁶ and the effort of *John of Salisbury* to turn men's thoughts from the subtle distinctions concerning genera and species to practical questions.⁷ Hence, also, the origin of the two celebrated mendicant orders, the Franciscans, disciples of the "friend

¹ Maurice, M. and M. P. 130.

² 1079-1142.

³ Maurice, Ib. 135.

⁴ Ib. 136.

⁵ 1096-1140. Maurice, Ib. 143.

⁶ Wrote his *Sentences* 1150. Maurice, Ib. 151.

⁷ d. 1180. Maurice, Ib. 157.

of the poor," the preacher of the Divine love,¹ whose instrument of philosophical research was spiritual intuition; and the Dominicans, called forth by the struggle with the dualistic pantheism developed in that passionate but chivalrous society, whose brilliancy Innocent IV. and Simon de Montfort extinguished in blood and fire.² The heretical appeal to the distinctions of the reason should be met by deeper reasoning. Such was the aim of St. Dominic. It was accomplished by the intellectual giant of the middle ages, *St. Thomas Aquinas*,³ who vanquished the nominalism founded on the relations of coexistence, by developing the idea of the *relations of succession*, through which the thought of being and its qualities is transformed into that of *substance* and its attributes.⁴

The intellectual training which led to this result was founded on the study of Aristotle, in Latin translations of the commentaries on his works used in the Mahomedan Universities of Spain and the East.⁵ For in Aristotle the relations of form and matter conceived by Abelard are reversed. Matter becomes a deep root of existence, which in the individual assumes a passing form.⁶ Yet since Aristotle ascends to the universal from the study of the varieties of the individual, the nominalist critic could not

¹ Maurice, M. and M. P. 163. ² Martin, *Histoire de la France*, iv. 1-64.

³ 1224-1274. At the Council of Trent his *Summa* was laid on the secretary's desk, together with the Scriptures, as containing the solution of all disputes (Martin, iv. 279).

⁴ This statement must not be confused with the position that Thomas Aquinas speaks of substance more frequently than other schoolmen. Formally his system turned upon those questions as to the nature of genera and species, in which, as Mr. Maurice tells us, the most serious men of that age felt all their most serious feeling to be involved (M. and M. P. iii. 232). But a species or a genus is a something thought of as essentially the same, though appearing under ever varied forms; and this we have seen to be the thought of substance. The debate as to species and genera was only the form under which the question, what do we mean by a substance, and whence do we get the thought of substances, presented itself to those great thinkers who, in the thirteenth and fourteenth centuries, endeavoured to rescue the Catholic sense of a Divine reality from their Nominalist or Conceptionalist predecessors.

⁵ For the effort of the See of Rome to forbid the study of his works, and the gradual admission of this study, see Maurice, lb. 185, 186.

⁶ Maurice, lb. 141.

charge his philosophy with resting on unrealities. What Aristotle had done for the ancient world, Thomas Aquinas sought to do for the modern world. He investigated all known or imaginable opinions, balancing them against each other to obtain a solution ; and *summed up* these solutions into a vast connected scheme of thought. The proof of his system seems to have lain for him in its comprehensiveness. Assuming that this summary of opinions embraced all the manifold relations of being, the conception from which all could be deduced must surely indicate the nature of that all-embracing Power whence all those relations arose.¹

3. But power separated from action becomes a mere possibility. The thought of a triangle, for instance, if it gives unity to the infinity of triangles producible out of it, exists only in their changing forms. In itself it seems to *be only in posse*, and to slip through our fingers if we try to lay hold of it. The theology of St. Thomas therefore could not satisfy the Franciscan longing for the consciousness of an immediate Divine presence within the soul. "The intellectual skill which included the Divine in a system, seemed to them to banish God as a living object."² In consequence, the great Franciscan contemporary of St. Thomas, *St. Bonaventura*³ sought an escape from logical fetters by distinguishing the light of knowledge into external and internal, each comprising two grades, the first, mechanical art and sensible cognition ; the second, philosophical knowledge and Divine grace.⁴ In the next generation, however, came a logical help, derived by the "subtlety" of *Duns Scotus*⁵ from considering substances not as possibilities of conception, but as constitutive principles.⁶ If we would ascend from the thought of

¹ Maurice, M. and M. P. iii. 190-194.

² *Ib.* 195. ³ 1221-1274.

⁴ *Ib.* 217.

⁵ *Ib.* 216-221.

⁶ In the phraseology of the schoolmen, this was expressed by the position that the universal is contained in the individual not in *posse*, as St. Thomas maintained, but in *actu*.

particular triangles to the general conception of a triangle, we must cast away one limitation after another, and thus seem to rise into a region of perpetually increasing emptiness. Yet since all these limitations are included in the definition of a triangle, this apparent emptiness would appear to be really an overwhelming fullness. So Duns Scotus argues as to species and genera; besides the unity of predication forming a genus, where the most comprehensive is the most negative, there must be a unity where the most comprehensive is the most positive. The primary being is not the last negation, but that which explains the being of all other things.¹

4. That there is a profound truth in these views, the illustration given above indicates. The ultimate determining power does contain whatever is evolved out of its determinations, and is not limited in *action*, because we distinguish it in thought from all the *possibilities* of limitation. So each *qualitative* determination, for instance, the definition of a triangle as the figure formed by the mutual intersections of three straight lines, is infinitely more full of thought than any of the special forms *quantitatively* evolved out of it. Nor is the case of the conceptions applied by us to explain natural phenomena different. In proportion as we penetrate to distinct ideas of natural forces, *e.g.* to the conception of gravitation, we discover that the universal is no empty abstraction, but is the summing up of a real power, underlying and giving unity to the infinity of phenomena. But presented as these notions were by Duns Scotus and his followers, not as the results of definite thoughts concerning either natural phenomena or mathematical constructions, but as the product of an analysis of the forms of thought crystallized in speech, they inevitably fell into absurdity. Between the primary

¹ This unity he called that of analogy or proportion. Health, *e.g.* is attributed, he says, primarily to man but by analogy to God. Maurice, M. and M. P. iii. 225.

essence and the individual there came in a series of intermediate essences, each less substantial than that whence it was derived; till *William of Occam*¹ swept the whole fabric away with the maxim, *entia non sunt multiplicanda*;² and taught that genera and species are but names, the signs of things, not the things themselves; helps to the intellect to rise to the idea of one all *pervading cause*, of which the universe with its multiplicity of individuals and species and genera are effects; and in whom, not in the thought of man, these universals have reality.

That Occam should have allowed to universals a reality in God, has often been brought up against him as an inconsistency. Mr. Maurice attributes this concession to his having indistinctly perceived that there was "a science beyond logic, not occupied with conceptions or the signs of conceptions."³ But whence came this perception? We apprehend from the alliance of the thought of cause, which principally occupied his mind, with that of substance. Occam saw that the cause of our conceptions lay in the limiting power of our own minds. Whence was this limiting power derived? Occam answered, from God. But then this power must point to a similar power in God, else it would be an effect without a cause. Consequently, God must produce universals as well as man, and in him these universals must have substantiality. They cannot be mere names, but must be realized in things. Thus Occam's philosophy was deeper than those have perceived who, in later times, approached his solution from a side of the problem opposite to that contemplated by him; and in place of regarding language as an instinctive affirmation of divine realities, have considered all human thought to be only a reflection of sensations. His nominalism was the expression of the general tendency of the fourteenth century, which forms the epoch of transition from that mediæval

¹ d. 1449. ² Entities are not to be multiplied. ³ M. and M. P. iv. 8.

philosophy whose object was the being and relations of the spiritual world disclosed by the teaching of the church, where the convictions of the individual were merged in reverence for the mystical body of Christ, to the world of modern thought; where the principle of individuality has asserted the equality of its rights in the spiritual universe, as, in the time of Socrates, it asserted its claims to attention against the claims of the world of sense.

III.—The strength of this principle manifests itself in the fourteenth and two following centuries on all sides. The depth of religious feeling pervading the works of the great mystics, *Tauler*,¹ *Gerson*,² and *Thomas a Kempis*,³ is due to its influence; their mysticism is the life of the soul in God, while the mysticism of other ages has often been the life of God in the soul.⁴ It conquered new worlds in East and West to European research; it penetrated to a familiarity with ancient learning; it broke the yoke of traditional authority by introducing a new theological system resting on an appeal to the Scriptures or the Fathers, interpreted by the individual judgment; it revolutionized all the received ideas of the nature of the universe, by overthrowing the testimony of the senses, through the reasonings of Copernicus and the telescope of Galileo; and it displayed itself in a host of attempts, founded partly on the ancient philosophy, partly on the teachings of the church, to comprehend the universe in one vast scheme of ideal thought. At length in the latter part of the sixteenth century, the tumultuous rush of opinion consequent upon opening the floodgates of speculation began to subside, and the modern thought of Europe took its stand on the newly conquered ground; where, rejecting the authority of all teachers except its own consciousness and the phenomena of nature, it set itself to determine, by a careful proving

¹ d. 1361.

² 1362-1429.

³ d. 1471.

⁴ As in the mysticism of *Eckart*, Tauler's teacher. For the contrast between the two see Maurice, M. and M. P. iv. 18, 29.

of these sources of truth, what could and what could not be known.

In this inquiry modern thought found two guides, (1) Renè Descartes, and (2) Francis Bacon, Lord Verulam and St. Alban's. The last, however, may be said in a certain sense to have introduced a new method of philosophizing. We will therefore consider his school in a separate chapter, and confine ourselves for the present to Descartes, whose philosophy leads us forwards upon the familiar path.¹

IV.—When *Descartes*² appeared, the philosophic thought of Europe was in the condition of a country recently swept by a deluge. The question of most importance to the thinker was the $\pi\omicron\upsilon\ \sigma\tau\hat{\omega}$; ³ what is the basis of solid knowledge? The answer of Descartes exactly accorded with the stage of thought at which we have arrived. I take my stand, he said, on my individual consciousness. *Cogito ergo sum*. Sir William Hamilton has justly observed, as Hegel had observed before, that this *ergo* must not be taken as a proof, but as an assertion. But neither has

¹ The philosophies of the fifteenth and sixteenth centuries fill, in modern thought, the place occupied in ancient thought by Plato and Aristotle. They served to launch men's minds on a new career. The exact position filled by these great masters of thought in Greece can never return, at least among a race acquainted with their writings. For it was their special task to point out the double process through which we attain to knowledge, (1) the ideal judgment; (2) the syllogistic inference. In the history of thought the function of Plato has been to make men feel that nature is penetrated by ideas, and to set them on the search for these ideas, whose discovery is the foundation of science; while the function of Aristotle has been to disclose the machinery by means of which the search can be prosecuted with effect; namely, the laborious accumulation of facts, and the careful application of inductive inferences to them. In a certain sense Descartes may be called the Plato, and Bacon the Aristotle, of modern thought. But the task of these great thinkers was not to repeat the work of Plato or Aristotle, but to use the methods of the Greek teachers in order to set men on investigating, from the opposite sides of deduction and observation, their relations as individual thinkers to that spiritual power of which Bacon and Descartes alike assumed the universe to be the manifestation. Among the multifarious philosophical products of this individualizing period is the philosophy of *Giordano Bruno*, which may appear to anticipate the course of thought here traced. But the thought of an organizing power, which forms the basis of his philosophy, is quite in its place in the historical position occupied by its author.

² 1596-1650.

³ Where can I stand?

noticed that the force of the statement to Descartes seems to have lain in the "I." *I* think, that is *I* am. *My thought* constitutes *my being* as a thinker; and is therefore incapable of question by *me*.¹ But this sense of individual being implies the existence of other beings besides itself. How is the thinker to pass from his certainty about himself to certainties about them? Descartes replies, through the *clearness* of his thoughts about them. That of which we find ourselves to have *distinct* ideas within the charmed circle of our own thought is certain. Hence his doctrine, that our conviction of the world revealed by the senses being a reality, depends on our confidence in God. He found that his conception of an all-perfect Being, the cause of all things, was far more distinct than his conceptions of the objects of sense.

V.—Now since we think of the limited as imperfect, the thought of an all-perfect Being passes into that of boundlessness; that which is unlimited. But this is the thought of space, which contains all finite being, and is indifferent to it: the infinite of the first stage of the ideal judgment,—the stage of mechanical distinction. Accordingly a *mechanical* character appears in every part of the system of Descartes. Matter and extension, *i.e.* space, are to him one. Animals are moving machines. In such a system the finite seems infinitely removed from the infinite; and by this infinite removal the infinite loses all reality, unless it absorbs all and becomes to thought one with its finite contents. Descartes, indeed, was preserved by his strong sense of personal activity, from sinking his individuality in the ocean of being. But his system led his followers to the verge of such a process. The plunge was made by Malebranche² and Spinoza.³

(1) To *Malebranche* the principle of individuality saved itself by taking refuge in the love of God. Intellectually his world is lost in God, to whose direct action on our

¹ See Discourse on Method, Maurice, M. and M. P. iv. 299, 311.

² 1638-1715.

³ 1632-1637.

minds he assigned our conceptions of the *primary* qualities of matter, size, figure, motion; and the *occasions* of our judgments as to its secondary qualities, colors, smells, sounds, tastes, etc.¹

(2) *Spinoza* substituted for personal love what he calls the intellectual love of God: the tranquillity of mind produced by the consciousness of realizing the unity of those Divine attributes, whence the manifoldness of existence arises. By removing the barrier of personal affection, he completed the transition from what we have called the mechanical, to what we have called the *chemical* stage of thought: from the thought of differences pointing to a hidden unity, to the thought of a unity existing in and through differences; or, in other words, from the consideration of the ideal judgment in its outward relations, to the consideration of its inward relations.²

VI.—According to *Spinoza's* own definition, an infinite substance can be expressed only by an infinity of attributes, yet he could enumerate two only, thought and extension. In fact, what he called the idea of God was only the consciousness, (1) of his own constructive self-determining power of thought; (2) of the primary conditions which this power produces in the exercise of its activity. Now this activity displays itself in the formation of ideal judgments, where the action of thought combines divers movements into a unity of space. The consideration of this judgment in its opposite aspects of distinctness and of unity, led to the systems of Descartes and *Spinoza*. Both aspects combine in the conception of *design*, which is embodied in the philosophy of *Leibnitz*.³

To Descartes the individual stands over against the

¹ Hence the saying that Malebranche "saw all in God."

² The absolute substance of *Spinoza* is distinguished from the absolute oneness of the school of Elea, by including the conception of individuality; and from the spiritual substance of the later schoolmen, by being a substitute for God. Its closest analogy is with the world-soul of the Stoics.

³ 1646-1776.

universal in absolute distinctness. To Spinoza the individual sinks into the universal, and is at once the end and the means through which the universal realises itself. To Leibnitz the universe consists of individualities (monads), of which each is itself a living force, susceptible of internal development, and possessing degrees of perception and consciousness adapted to its constitution ; while it forms part of a universal system, through the predetermined harmony of its own modifications with those of the monads around it. These three great masters of philosophy had the common aim, of discovering what thoughts would produce certainty of knowledge and propounding a criterion of such thoughts. The search was founded upon the feeling of certainty attending the investigation of ideal judgments, with which all three were practically familiarised by their mathematical studies. And the criteria respectively proposed by them, correspond to the successive stages of thought produced by that investigation—the mechanical, the chemical, and the teleological. For the criterion of Descartes was clearness of thought, so especially characteristic of mechanical conceptions. That of Spinoza was self-sufficiency, the special character of chemical union, which rests on the neutrality of self-balancing forces. While that of Leibnitz was self-consistency, the impossibility of conceiving the contrary, which marks the thought of the co-ordination of distinct parts into a whole ; for, without the co-ordination, the parts cease to be parts.

VII.—We have now reached that stage in the progress of thought where the *relation between subjective and objective*—the knowing mind and the thing known—becomes the natural topic of speculative research. At this stage, in the history of Greek thought, appeared Neo-Platonism. The corresponding phase in the history of modern thought produced two daring thinkers who grappled with the problem in its entirety—Kant¹ and Fichte.²

¹ 1724-1804.

² 1762-1814.

1. *Kant* is connected with *Leibnitz* by *Wolf*, through whose pedantic classifications, combined with the scepticism of *Hume*, he was induced to enter upon his profound investigation; but who cannot be said otherwise to have contributed to the progress of thought. He undertook the gigantic task, (1) of separating the partial and accidental from the universal and necessary in the elements of our knowledge; (2) of determining how far this latter element justifies any conclusions as to the nature of our own minds, or of the universe round us. The result of this investigation was, that *Kant* enumerated as the universal and necessary elements of knowledge: (1) the thoughts attaching to every ideal judgment in respect of the conditions of its being, that is to say, the thoughts of space, time, and motion in its twofold aspect of quality (*i.e.*, direction), and of quantity: (2) the thoughts expressive of the relations of the parts of these judgments, when conceived either as coexisting in space, or as succeeding each other in time:¹ (3) the principle of individuality through which such judgments are formed, under the twofold aspect—of the soul, as free and immortal;—and of God, from whom the soul and the universe arises as a totality of wise and benevolent design.

Kant was a great discoverer in the world of metaphysics. But, as has sometimes happened to discoverers in the world of physics, he laid down the prominent peaks without pointing out the connexion between them. On the contrary, he seemed to isolate the great thoughts connected with the principle of individuality from all our other knowledge, by indicating a series of contradictions which appeared to belong to these particular thoughts, because their origin in the law of thought, and consequent existence in all thought, had not been discovered. *Kant* solved the difficulty arising from this observation, by distinguish-

¹ Hence is derived the table of categories, for which see Appendix to Part III.

ing the understanding from the reason, and further, distinguishing the reason itself into theoretical and practical. The mind, he said, gives form to the impressions derived from the senses, by applying to them, through the understanding, the intuitions of space and time, and the conceptions of relation drawn from the theoretical reason. Thus it attains to the thought of design in the universe. But the theoretical reason cannot show that there are any realities corresponding to its intuitions or conceptions. It must rely for the conviction of any permanent reality upon the assumptions made by its practical neighbor as the foundation of morals and religion.

2. Thus Kant presented to thought a Barmecide feast. He allowed that there are both solid truths and necessary thoughts, but denied to man the power of passing from the necessary thoughts to the solid truths. The reason could not rest satisfied with such a result. Accordingly, Fichte attempted to scale the heights of absolute knowledge, from the opposite peak of absolute will, by a ladder of necessary thought. He seized upon the conception of the boundless constructive activity of thought, the infinity of the "me," as the principle whence to derive the universe, by its limitations of itself. From these limitations he deduced both the conditions of sensible knowledge stated by Kant, and the certainties referred by him to the practical reason. But he never succeeded in showing how the "me" came to limit its own activity. Of this operation, Fichte gave no other explanation than that it was wanted to account for the universe. Now as the account it gave of the universe was opposed to our consciousness, which certainly does not testify that our wills produce our perceptions, and the objects which give rise to them, Fichte gradually abandoned his original position, and sought for some independent principle, through which to *reconcile the opposition of subject and object* in the individual.

VIII.—But death carried off Fichte before he had

elaborated his ideas to philosophical clearness; and the task of reconciliation fell into the hands of two celebrated philosophers, by whom it has been attempted on the basis, (1) of intuitive perception, (2) of logical deduction,—Schelling,¹ and Hegel.²

1. Every ideal judgment involves a threefold action: (1) A movement of expansion, the thought of motions directed outwards from different centres; (2) a movement of concentration, the conception of these movements as mutually limiting each other; (3) a point of indifference, that is, the judgment resulting from the movements so limited. On this threefold movement of thought *Schelling* seized with the intuition of poetic genius. It was not difficult for him to educe from it a system of the universe. Nature as a totality represented the expanding, mind the concentrating movement; these opposites uniting in the absolute or self-existing being of God, which is neither mind nor nature exclusively, but both indifferently. By a repetition of the same process the great divisions of natural and human action were evolved.

In justification of his system, Schelling appealed to the analogy of consciousness. Thought concentrates itself by a reflection consequent upon a previous going forth into the world of phenomena. The movement of concentration could be thus shown to imply expansion. Conversely, the movement of expansion must imply concentration. In both cases the infinite gave rise to the finite. In our minds the process of going forth constituted the imagination; that of concentration or reflection constituted the understanding; while the reason, as the principle of indifference, recognized in the universe the law of being discovered by the intuition of itself. But, imposing as was this philosophy in its systematic coherence, its basis was unsatisfactory. Truths intuitively discernible ought to be generally discerned. So that Schelling's philosophy,

¹ 1775-1858.

² 1770-1832.

instead of being the fruit of long ages of thought, should have constituted the foundation of philosophic investigation. But Schelling's intuitive process, if reduced to its simplest form, becomes, as we have seen, a statement of the universal action of thought. Now, every thought distinguishes itself from all other thoughts, which it opposes to itself as the negation of itself; as all that which it is not. But every thought has also a tendency to draw this negation of itself into itself, and by this operation to constitute a new thought. If, then, it were possible to find a series of thoughts such that, commencing with the simplest and barest possible, the others should successively grow out of the first by a perpetual repetition of the process, there must arise a scheme of necessary thought, resting on the most solid foundation—namely, on the unchangeable action of thought itself; and through this scheme it might be possible logically to combine all being into one connected series.

2. This conception is the basis of *Hegel's* philosophy. Its importance, as an exposition of the law of thought, will be apparent to all who have entered into the present argument. That, nevertheless, it led its illustrious exponent into grievous errors, must be admitted by those who are not prepared to reject the doctrine of the universal gravitation of matter, and the whole system of astronomy built upon it; to deny that light consists of rays separable by a prism; that it is capable of refraction; that bodies are seen by rays reflected in every direction; that it has a definite speed, etc., etc.¹ The cause of these errors lies in the confusion made by Hegel between the law of thought and the thoughts produced under that law. When Hegel en-

¹ For proof of this almost incredible audacity of denial, see Hegel's *Encyclopedie*, § 260, 270, 279, 320, 370. His account of the tides is: "Der mond ist ein wasserloses Krystal der sich an unserm Meere gleichsam zu integriren, die *Durst* seiner Starheit zu erlöschen sucht, und daher *Ebbe* und *Fluth* bewirkt. Das Meer erhöht sich in Begriff zum Monde zu flieheu, und der Mond es an sich zu reisen." Why the sea rises contemporaneously on the side of the earth *furthest* from the moon, Hegel does not condescend to explain.

deavored to educe the universe from the law of thought, he forgot that, according to his own deductions, if the *form* of thought is necessary, its *essence* is the exercise of free will. The knowledge of the law of thought may enable us to show that any particular object is produced by the action of thought, but it cannot show what particular limitations of thought constitute that object. For the form, being the condition of *every* limitation, must apply to *all* alike, whatever their subject matter. Hegel assumes that, in dealing with our own conscious thought, we are dealing directly with the power whence the universe arises. But if, as we have seen, and as Hegel argues, all thought is the utterance of will; then, since common sense testifies that the universe does not proceed from *our* will, it cannot be the utterance of *our* thought; and to suppose that we can deduce its phenomena *a priori* from the study of our own thought, is as unreasonable as it would be to suppose that we could directly deduce other men's thoughts from studying our own.

That the operation is impracticable appears further from examining the process through which Hegel attempts to effect it. He begins by describing the succession of thoughts involved in the formation of ideal judgments as operations anterior to the thoughts of space and time, and therefore expressing the action of the eternal. When he has carried this spiritual development through all its stages, he introduces the thoughts of space and time as sensible realities, to form the foundation of the second stage of thought; where it becomes "the other" of itself, and thus constitutes the universe by producing a series of physical states, corresponding to the logical states of its first stage, until it attains the consciousness of itself in man. Here commences a third correspondent series of developments in human history, marking the steps of its advance to the recognition of its true nature, as the infinite self-constituting mind which beholds itself in the other of itself.

But in this operation the space and time existing *in* our thoughts are confused with the space and time existing *for* our senses. The logical process is so far from being anterior to these thoughts that it rests upon them.¹ Therefore the space and time which form the foundation for Hegel's "other of thought," must be derived, not from the direct action of thought, but from its interpretation of sense through the analogies of its own action; and since, as the beginning so must be the continuance, it follows that, in studying the world of sense, we must proceed only as the interpreters of observation, and not as if we had originated the things observed.

The philosophy of Hegel completed another great metaphysical year. Once more the human mind had exhausted, in its attempts to explain the universe, all the successive phases involved in the constructive action of thought, and had reached the end of the chain. Greek thought began by ascribing reality to the objects of sensation, and sought a principle of physical unity beneath their variable appearances. By developing this conception it attained to the opposite conception, of a spiritual essence manifested through these objects and constituting a reality transcending the shows of sense. With this conception modern European thought began. After a series of developments, answering step by step to the older series, and occupying nearly the same time, it has arrived at the conclusion that this spiritual essence implies a sensible body through which it may manifest itself. In each case the true subject matter of the successive philosophical systems has been the action of our own thought. The value of the double development mainly consists in the testimony thus borne to the law of this action. It is the great merit of Hegel to have exhibited in their logical connexion the phases of thought produced by its law, which, when viewed as disconnected conceptions, give to metaphysical research the appearance of

¹ See note to chapter iii.

a never-ending fruitless contest about barren subtleties. Thus the law of thought has become discernible beneath the flood of metaphysical systems, and its discovery furnishes us with a new and most valuable instrument of research into the mysteries of nature.

But, that we may use this instrument for that purpose, we must learn to distinguish the law from the thoughts to which it gives their form. Because Hegel did not make this distinction, his discovery has not yet been appreciated as it deserves. He proposed his system as a complete explanation of the universe; and since men did not find in it the promised *sesame*, they turned elsewhere. Yet the history of German philosophy, since the death of Hegel, testifies that his system marks a great epoch in philosophical thought, (1) by the retrograde character of the systems which have claimed to be an advance upon his system; (2) by the confused babel of voices arising from those who have sought to retain the ground occupied by Hegel and his immediate predecessors.

I.—1. The result of Hegel's philosophy, as it is expounded by *Strauss* and his school, is that God is incarnate, not especially in Christ, but in the whole race of mankind, who collectively constitute the true God-man. *Ludwig Feuerbach*¹ grasped this result, disregarding the logical process adduced in proof of it. In place of the Hegelian dialectics he substituted the intuition of Schelling, *without* its rhythmical movement. Since human nature possesses those elements of intelligence, free thought, and tenderness, which the conception of God, and more especially of the Christian God, idealizes, therefore, argued Feuerbach, it is idle to assume a reality corresponding to this ideal distinct from man. For the last 6,000 years he has gazed at his own image, projected, more or less perfectly, against the clouds. But his true God is the inex-

¹ *Wesen des Christenthums*, 1841; *Grundzüge der Philosophie der Zukunft*, 1843.

pressible Being manifested in himself. Let him learn that the genuine object for human reverence is humanity; that morality is the only true religion, and the basis of all solid philosophy.

2. But this "humanity" of Feuerbach is as "ideal" as Hegel's self-incarnating thought of God. Therefore *Max Stirner*¹ opposed to it the individual "me," which exists not to realize ideas, but to live for itself; and recognizes "no other calling than the calling of the plant," the call to assert its own nature. His philosophy is the philosophy of Fichte, *without* its moral dignity, which at the best can but mimic the attitude of a Prometheus, and clench its fists at the universe, in the powerless assertion of its individual absoluteness; while it runs perpetual risk of being wrecked on the shoals of sensuality or cynicism.

3. The last stage in this backward "progress" is the return to Kant's "thing in itself," *without* his intuitions of space or time, his forms of the understanding, or ideas of the practical reason; that is to say, the philosophy of pure materialism. This French dish of the eighteenth century *Bruchner*, *Czobbe*, and their disciples, have served up in the midst of the nineteenth, for the thinking public of Germany,² garnished indeed with the discoveries of modern physiology, but without the glowing hope of a perfectible humanity, through which the Gallic cooks of the old regime gave a spiritual savor to their viands.

II.—The history of French materialism negatives the possibility of such systems being able to maintain their ground long, however large an array of combatants they may number at the present time. Their progress has been in no small degree facilitated by the chaos of ideal systems through which their opponents have attempted to evade the grasp of the Hegelian logic, by seeking for their doctrines, some other foundation than the only solid foundation

¹ *Der Einzige und Sein Eigenthum*, 1845.

² See *Vierteljähriges Schrift*, 1856, Part. II., 234-246.

of ideal philosophy—namely, the principle of thought. These systems form two great divisions:

1. First is the school which traces its filiation to Hegel, and deduces its conclusions with logical precision from some premiss assumed to have been overlooked by the master. *K. P. Fischer*, for instance, postulates God and nature, as two poles between which lie the spirit manifested in the individual and that manifested in the world. *C. F. Bramiss* postulates an absolute action, producing an absolute being, whence arises an absolute consciousness, the whole constituting a theological universe, over against which he sets the cosmological universe. *T. S. Neiff* postulates a finite substance coexisting with an infinite substance, into which it is incapable of passing, etc. etc.

2. In opposition to this army of postulants stand an army of intuitionists, the *disciples of Schelling's* later teachings, who appeal to the omnipotence of the imagination, to construct a universe agreeable to their religious feelings, their notions of what the world ought to be; but appear generally to have the merit of carefully studying the facts of nature; a merit shared by such writers as *F. A. Trendelenberg*, to whose labors reference has frequently been made by us, and *T. H. Fichte*, son of the celebrated philosopher, who has endeavored to find a solid foundation for metaphysics on the uncertain basis of psychology.¹

¹ For further details of the systems of German philosophy since Hegel's death, see *Conversations-Lexicon Die Gegenwart*, vii. 292-341.

This depreciatory judgment on the latest generation of German philosophers must not be confused with a denial of merit to their treatment of many philosophical questions, especially those connected with the history of philosophy, a department in which they appear to us to have made important progress in more than one direction. But we think it must be admitted that German philosophy since she alighted from Hegel's balloon has appeared exceedingly at a loss to know exactly where she is, and what road she ought to follow. That this should be the case accords perfectly with our theory of the internal law on which the connexion of philosophical systems depends; and the natural explanation thus afforded of an issue, apparently so strange, to the persistent efforts of so many profound thinkers as Germany has produced during the last thirty years, is to us a strong confirmation of the truth of our theory.

A more important place must be assigned to the last of these later philosophers whom we can notice here, *Arthur Schopenhauer*,¹ whose great work, *Die Welt als Wille und als Vorstellung*,² neglected on its publication forty years since when Hegelianism was in the ascendant, has recently emerged into notice and influence.

In range of knowledge Schopenhauer equals Hegel, while he far surpasses him in the clearness of his exposition; and his philosophy, like the system of Hegel, rests upon one of the great facts of human consciousness, bringing forward a side of it neglected by his rival. We have seen that the constructions of thought result from the exercise of will, which, indeed, acts only by thinking, but forms the basis of all thought. Now by Hegel the *will* was thrown into the background. He saw in the universe the result of the perpetual evolution of thought, leading, it is true, to the perception of will, but only in that final stage of the process, where thought became conscious of itself. To Schopenhauer the world arises for our consciousness through the action of the faculty of *will* or causality, which uses the forms of space and time furnished by itself, in order to give unity to the impressions of sense; and *thought* is only the power of reflecting the unities thus constituted. So Hegel's world is reversed by Schopenhauer. But, as an explanation of the universe, however ingenious and in many respects full of truth his theories are, they are open to the same sort of objection as those of Hegel, namely, that of applying the results of the study of our own minds *directly* to the world of sense, whereas they are directly true only of ourselves, and we can argue from them to the world only by analogy. Schopenhauer is obliged to refine away the testimony of consciousness to the distinction between ourselves and the objects of our perceptions, in order that he may present these as the expression of that power of will of which we are conscious.

¹ 1788-1860.

² The world considered as will and presentation.

Now that the world of sense is the utterance of a conscious will analogous to the human will, we do not deny. But this world of sense *occupies* space, and *exists* in time; while we, by our united power of will and thought, can indeed conceive a world so existing, but can no more *produce this occupation and existence by our wills than by our thoughts*. Between ourselves and the objects of sense there is therefore a difference, which it is the business of the metaphysician to explain if he can, but certainly not to talk away.¹ The philosophy of Schopenhauer, then, can be regarded only as a valuable complement to Hegel's exposition of the law of thought, by asserting the nature of that power which produces thought and gives rise to its law in *our* minds. At the same time, by the importance assigned in it to the testimony of sense, it carries us back to that phase of European philosophy, to which we must now turn—the School of Bacon.²

¹ This objection is not removed by Schopenhauer's distinction of the will into "*Ursache*" (cause), shown in inorganic *being*; *Reiz* (irritability) shown in organised structures; and *Motif* (motives), shown in the conscious will; for the only will of which we have any *direct* knowledge is *Motif*; whence *Reiz* and *Ursache* may indeed be legitimately inferred, but cannot be directly known.

² See *Foucher de Careil*, Hegel et Schopenhauer, for an interesting account of this philosopher, and a critique of his views. With Schopenhauer may be appropriately associated another eminent, though earlier thinker, T. F. Herbart (1776-1841), who, like Schopenhauer, took Kant's "thing in itself" as the basis of his philosophy, and used as the bridge between our consciousness and this object, our mathematical faculties. That Herbart's method is founded upon a true insight into the action of thought, is shown by the relation between mathematics and metaphysics, pointed out in Appendix I. The constructive power of thought does produce, as its fundamental expression, those conceptions whence mathematical science arises. But although we thus attain the means of measuring forces, and so making their operation intelligible to our minds, we do not thus show how they are produced. The "thing in itself" remains, after we have measured it, as before, a phenomenon, separated from ourselves by a gulph which mathematical formulæ cannot cross.

CHAPTER X.

The Baconian Philosophy.

IV*.—The principle of individuality appeared in our modern world as the claim of thought to admit nothing to be true but that of the truth of which the thinker was personally satisfied. Hence the question, "What is the test of truth?" became the pivotal question for the future of philosophy. It received two answers. The answer of Descartes, whence arose the systems of philosophy whose succession we have followed, was: "That is true which can be distinctly thought." The opposite answer of *Bacon* was: "That is true which can be distinctly perceived." Such an answer is possible at any period in the progress of thought; for, at all times, the perceptions of sense must be accompanied by the conviction of a reality perceived distinct from our perceiving being. But it was peculiarly likely to be given and accepted at a time when, in the advance of thought, men had turned from the assertion of their individual independence, to ask what could give consistency to their individual convictions? what there was in the world besides the individual thinker on which he might rely? and when, at the same time, the advance of knowledge began to afford a clearer insight into the wonderful order by which this external world is characterized. Accordingly it has gained for Bacon the credit due to the inaugurator of a new method of philosophy.

Bacon has been praised by Lord Macaulay for placing the end of science in the acquisition of such a knowledge

of the objects of sense as may conduce to the outward advantage of mankind. And unquestionably his imagination delighted in dwelling on the "fruit" to arise from the wise application of natural powers to human service. But that this is the true *end* of knowledge Bacon expressly denies in his eloquent enumeration of false ends;¹ the true end being "from both philosophies (that of nature and that of morality and policy) to separate and reject vain and empty shadows, and preserve all that is solid and fruitful." Philosophy he declared to have "three objects—God, Nature, and Man; and also three kinds of rays. For Nature strikes the intellect with a direct ray; God with a refracted ray, from the inequality of medium betwixt the Creator and the creature; and Man, as exhibited to himself, with a reflected ray."² "Men," he says, "have withdrawn themselves from the contemplation of Nature and experience, and sported with their own reason and the fictions of fancy;" "they seek for truth in their own little world, and not in the great world about them; and, as they disdain to spell, so they can never come to read the volume of God's works; but, on the contrary, by continual thought and agitation of wit, compel their own genius to divine and utter oracles, whereby they are deservedly deluded."³ But Bacon was so far from excluding the hope of penetrating to the "essential form or true differences of things," that he praises Plato for seeing that "forms were the true objects of knowledge;" though accusing him of having "lost the advantage of this opinion by contemplating and grasping at forms totally abstracted from matter, and not as determined by it."⁴

In short, Bacon urged men to seek the road to truth through the study of creation, and not through the study of their own imaginations. The subsequent history of the

¹ De Augmentis, Preliminaries, iii. 48. In the same passage he compares "the applying of knowledge to lucre" to the "golden ball thrown down before Atalanta, which while she stops to pick up, the race is hindered."

² De Augmentis, i., § 3, 1.

³ Ib. Prelim. iii., 43.

⁴ Ib. i., § 5, 1.

physical sciences is the glorious evidence of the "fruitfulness" of this advice, in its application to nature. We have now to trace its effects on the science of mind.

V*.—Bacon had brought man to the feet of nature, as to a Divine oracle, humbly to listen to her utterances. Thus man as the learner was opposed to nature as the teacher. But the character of the distinction made its preservation impossible. If man is only a listener to a voice without himself, if he contributes nothing of his own to his knowledge, the difference between himself and his teacher vanishes. *Nature becomes all in all*, and man must be either one with her or nothing. Therefore, as Descartes, in ascending to the thought of God by removing all limitations from human thought, prepared the way for the philosophies of Malebranche and Spinoza, where God became only the limiting principle of thought in man and of extension in the universe; so Bacon, by placing the grounds of human certainty solely in the phenomena attested by sense, led to the philosophies of *Hobbes*¹ and *Locke*,² from whom proceeded the dominant philosophical conceptions of the eighteenth century. These were: (1) that human thought is only the reflection of an action external to itself; (2) that all knowledge required to be reconstructed upon this basis. We trace these principles everywhere. They led *Jonathan Edwards*³ to resolve the function of the will into the action and opposition of motives. They gave a point to *Voltaire's* satire on the ancient doctrines about the soul.⁴ From them *Rousseau's* system of education, his sentimental morality, and his maxims of the inalienable sovereignty of the people, derived their strength.⁵ And, as did the ideal philosophy, so did this system of thought give rise to a teleology, a philosophy resting on the conception of design.

VI*.—This philosophy, however, assumed a practical

¹ 1588-1679.

² Maurice, M. and M. P., iv. 471.

³ 1662-1704.

⁴ Ib. 489.

⁵ Ib. 553-558.

aspect, suited to the system of thought to which it belonged ; namely, the aspect of a scheme of *morals founded on utility*. If all our thoughts are the reflections of some external action, modified only by subsequent associations,¹ there is no source whence the sense of right and wrong can be derived but, (1) the actual pleasure or pain linked by nature directly or indirectly with the doing or omission of this or that action ; or (2) the apprehension of future pleasure or pain to be linked with these doings or omissions hereafter by the judgment of God. Accordingly morality was based by *Paley*² on the second of these grounds ; by *Hutcheson*³ on the first ; to which *Jeremy Bentham*⁴ afterwards gave dignity, by expanding it into the formula of "the greatest happiness for the greatest number." So where the belief in a personal God remained, it could find support only by deducing his existence from the marks of design displayed in the universe, through the assumption that the appearance of design implies a designer distinct from the objects wherein it is displayed ; while those to whom this proof seemed inconclusive, logically rejected the belief in such an "architect of the universe," and substituted Nature in the place of God.

VII*. and VIII*.—But the consciousness of man could not rest in such conclusions. The active energy of thought naturally leads to the conception of a thinking "me," opposed to the "not-me," of which it thinks, and possessing qualities of its own, independent of any action upon it. Accordingly, questions of the *relation of the "me" to the "not-me ;"* of the share to be assigned to each factor in the production of our knowledge ; and of the authority due to each, gradually invaded the whole domain of the Baconian

¹ First prominently insisted upon by *Hartley*, 1705-1757.

² 1743-1806.

³ 1694-1747. His principal work is a "System of Moral Philosophy," of which the fourth edition, published in 1746, contains an account of his life and writings. He was a Professor at Glasgow.

⁴ 1747-1834.

philosophy, and gave rise to a multiplicity of conflicting hypotheses.¹ Already, in the first half of the eighteenth century, *Bishop Berkeley*² had urged that, as we cannot experimentally show what the substratum of that which we perceive by our senses is, the impressions on these senses may be spiritual realities, the symbols of a divine language through which we hold converse directly with the thoughts of God. *Bishop Butler* had followed, with greater caution, to build up the belief in a spiritual consciousness and a divine government, upon the observed facts of human nature and history. But the general assertion, as a philosophical principle, within the school of Bacon of the distinction between the knowable universe and the knowing individual is due to the struggle of Scotch sound sense against Scotch subtlety.

Locke had reduced the function of the mind to dealing with the pictures made on it through the senses, taking for granted that these pictures were not mere shows of being, but gave us notions of a something permanent within ourselves, and in the universe. But the pictures are notoriously fugitive and changeable. *Hume*³ asked, how do you *prove* that they represent anything unchangeable and permanent? How do you *show* that the being who reflects them is anything more than a bundle of changing impressions? What answer could be given from Locke's standing point? *Reid*⁴ replied there is no answer possible from this standing point, but the mistake is to stand there.

¹ We have classed together divisions VII*. and VIII*. because, in the school of Bacon, the questions, (1) of the principle of knowledge, (2) of the relation of knowledge to will, have never been clearly separated, a result due to the great importance attached in this school to the knowledge derived from the observation of nature. A Baconian philosophy, which should recognize the true relation of will to knowledge, would put an end to the distinction between the school of Bacon and that of Descartes, by reconciling the real and ideal philosophies. It would effect what the present work attempts.

² 1684-1753. See Maurice, M. and M. P. iv. 456, and an able article on the Bishop's philosophy in Macmillan's Magazine for July, 1862, where, however, the great defect of Berkeley's system in sacrificing the individuality of man to the manifestation of God is not sufficiently noticed.

³ 1711-1770.

⁴ 1709-1796.

Stand on your common sense, and you will find solid ground. When I see the sun, he argued, I am certain that I see something not in myself, but out of myself, which other persons may see also. When I think, or perceive, or feel, I am certain that that which thinks, or perceives, or feels within me is not a mere bundle of impressions, but a distinct being. How I get this certainty I do not undertake to explain, any more than how I perceive or think at all. But there it is, and I *won't* be talked out of it.

But this honest *noli me tangere* philosophy had the defect natural to a philosophy based upon the distrust of thought. It gave up one main function of philosophy, namely, that of showing whence our sense of certainty is derived. Accordingly Reid's successors refined upon his positions in the hopes of supplying this defect by a more complete analysis of consciousness, till, under the hands of *Sir William Hamilton* and his followers, the system has assumed this strange aspect:—1. That we are compelled by our nature to place unhesitating confidence in the "deliverances of consciousness." *But* that, nevertheless, we are not justified in placing confidence in any "deliverance of consciousness," except the sense of something extended, against which our bodies impinge. For although our consciousness testifies that we see, or hear, or smell other bodies, it is quite certain that we do not do so.

2. That the thoughts of space and time belong to our minds, and cannot be thought away. *But* that nevertheless we cannot rely upon them to give us any certain knowledge. For they may belong *only* to our intelligence.

3. That the thoughts of causality, of the infinite, and the absolute, express only the weakness of our intellect, and involve irreconcilable contradictions. *But* that nevertheless we are bound to believe in an absolute, infinite cause, though we cannot think of it.¹

¹ To these perplexities Professor Mansel, in his Bampton Lectures, has added a fourth, namely, that we have a moral sense; *but* that we cannot trust

Now, of these perplexities we will for the present defer considering the first, and confine ourselves to showing that the two last are completely solved by the conception of the constructive action of thought explained above. 1. We have seen that the thoughts of *space and time* are not fetters put on our power of thought, but the result of its free action. So that to suppose that the absence of these conditions may characterize some higher form of intelligence, is to suppose that it may be possible for such an intelligence to *think without thinking*. 2. Again, the difficulties connected with the thought of the *infinite* depend upon the assumption that the infinite is that from which the thought of the finite is excluded. Now, infinite and finite are a pair of the opposites of thought. But so are inside and outside. What proof is there that the one pair of thoughts can be separated more than the other? If we consider the nature of an ideal judgment we shall see that the true definition of the infinite is "that which produces the finite." The constructive power of thought is infinite. We can set no limit to it, either in space or time. And each of its constructions preserves this character, since each admits of endless modifications. Yet this infinite power can act only by limiting itself in finite constructions. Now, to think of an infinite power without thinking of its results, is to think of a cause apart from its effects: the thought of the power turns into that of a mere possibility, and the conception of its action into a mere *belief* that it can act; that is, into Sir W. Hamilton's notion of the infinite. If the power be supposed to pass into act, this belief may be converted into a *conception* of its mode of action,—a conception which must be "inadequate," since it can never express all the possible

it, because what we think unjust, may to God appear just, etc.; a proposition not to be confused with the statement that our conception of moral goodness is, like all our other conceptions, progressive; and therefore that we must not so rely on any of our judgments on moral questions as to refuse to examine whether they are well grounded.

ways of realizing the action ; but is not therefore "unreal," since it expresses an existing action. Here we have the notion of the infinite, opposed to Sir W. Hamilton, by *Mr. Calderwood*, and other writers who have recently combated Sir William's doctrines.¹

¹ Sir William, in an interesting criticism on Mr. Calderwood's theories, published by the latter as an appendix to the second edition of his *Philosophy of the Infinite*, adduces such words as "unthinkable," "incomprehensible," "inconceivable," "unimaginable," etc., in reply to an argument of Mr. C., that the general use of the word infinite implies an instinctive sense in mankind of a positive thought expressed by that term. But the words cited by Sir William are *not mere negatives*, as he contends. Each limits or shuts in some particular exercise of the power of thought by shutting out others. The "incomprehensible" may be "conceived," though not "comprehended:" as the thought of space. The "inconceivable" may be "imagined," though not "conceived:" as the fact of attraction. The "unimaginable" may be "thought of," though not "imagined:" as the asymptotes of an hyperbola. The "unthinkable" may be "thought about," though not "thought of:" as in the mathematical proof by *reductio ad absurdum*, etc. Each of these negations includes a residuum of mental power, untouched by what it sweeps away. If then the "infinite" expressed no positive thought, this word would not conform to the analogy of those cited by Sir William. But the analogy is perfect. The difference between "the infinite" and these other negatives is, that while they apply only to particular phases of thought, it applies to the power of thought itself, that thought of being which enters into all thought ; as "the absolute" applies to the thought of relation, which is involved in every exercise of this power. There is no retreat within the mansion of thought for the "infinite" and the "absolute," because they are names for the faculty which constructs the mansion.

The weakness of the reasoning adduced to perplex the thought of "the infinite," may be illustrated by the following adaptation of part of Professor Mansel's argument in his *Bampton Lectures*, to show that we cannot think of "the finite":—"The *finite*, if it is to be conceived at all, must be conceived as potentially everything, and actually nothing. For if there be anything in general which the *finite* cannot be, *this would not be finite*; and if there be anything in particular which it actually is, this is thereby excluded from being any other thing. But again it must also be conceived as actually everything and potentially nothing. *For every possible finite thing must be included under 'the finite.'* But if '*the finite*' could become anything which it actually is not, there would be some possible finite thing not so included. This contradiction, which is wholly inexplicable on the supposition that the *finite* is a positive subject of human thought, is at once accounted for if it is regarded as the mere negation of thought. If all thought is (*distinct*) limitation, the *finite*, from a human point of view, is merely a name for the absence of those conditions under which thought is possible. To speak of a conception of the *finite*, is therefore at once to affirm these conditions and to deny them. The contradiction which we discover in such a conception is only that in which we have placed ourselves, by tacitly assuming the conceivability of the inconceivable. The condition of consciousness is distinction, and the condition of distinction is (*definite*) limitation. We can have no consciousness of being in general, which is not some being in particular."—[See *Bampton Lectures*, 71,

So the difficulty in the perpetual retrogression connected with the thought of *cause* disappears, when we perceive that cause and effect are names for conditions, reciprocally determining each other in a circle of contingencies produced by the constructive action of thought in the formation of its ideal judgments. The relations of the sides of each triangle to each other, for instance, are the effects of its triangular form, and the cause of its particular character; while both cause and effect arise from the constructive power of thought, which freely constitutes the general form, and determines the particular quantities of sides and angles. The maxim that "there can be no effect without a cause," expresses our consciousness, that whatever happens we can always imagine the possibility of its happening otherwise; that our thoughts are not bound by our perceptions, but see in every phenomenon a contingency depending upon conditions capable of variation. The maxim proves, not the weakness of our intellects, but the omnipotence of our imaginations. If its ground had been, as Sir William Hamilton supposes, that we are "astricted" to think of events taking place in time, and cannot assign a beginning to time, by parity of reason, we must have thought that no cause could be finite; because we are

72. The italics mark the changes made in order to adapt the argument from the "infinite" to the "finite."] But what would a congregation such as collects at St. Mary's say of a preacher, who, after having dished up to them such a pretty mess of ingenious subtleties, should conclude, "therefore, my brethren, you see it is impossible for us to think of *a finite object*?" Now, as we can think of "a finite thing," though we cannot think of "the finite," so we can think of *an infinite power*, manifested in the production of finite objects, though we cannot think of "the infinite" by itself.

In regard to this thought of the infinite, we may also observe that there are several forms of infinity:—

- I. There is the infinite of *power*: the infinite of the bare thought of being.
- II. There is the infinite of *wisdom*: the infinite of the thought of relation.
- III. There is the infinite of *beauty*: the infinite displayed in the constitution of the individual.
- IV. There is the infinite of *goodness*: the infinite displayed in the adaptation of these individuals to each other.

Prof. Mansel deals only with the first of these forms of the infinite, and takes no notice of the other three.

"astricted" to think of causes acting in space, and cannot fix a limit to space.

All these difficulties stored up in Sir William's "Philosophy of the Unconditioned," vanish before the conception that thought is essentially a constructive self-limiting will, of which we can affirm with absolute certainty, it is; a power whose beginning to be is inconceivable and unimaginable; a power whence space and time perpetually flow, forming, not the conditions of its being, but the manifestations of its exercise, and exhibiting in their apparent contradictions the universal character of all its utterances, in their simplest expression.¹

The great source of error in these controversies has lain in the characteristic peculiarities of thought having been confused with the peculiarities of certain thoughts concerning God and the universe, where these characteristics first specially attracted notice. The indefiniteness and con-

¹ Compare Sir Isaac Newton's Scholium on God:—*Non est eternitas, et infinitas, non est duratio et spatium; sed durat et adest. Durat semper, et adest ubique: et existendo semper et ubique, durationem, et spatium constituit.*—Optics iii. 28.

Sir William Hamilton has accused Hegel of having "inconceivably mistaken contradictories for contraries," and thus based his philosophy on an impossible union. If this objection were valid, it would be fatal to the present argument. But it is worthless, even on the narrow ground of logical distinction. In logic, "contraries" are not universally opposed, while "contradictories" are. The propositions "all triangles are right angled," and "no triangles are right angled," agree in being false; while of the propositions "all triangles are right angled," and "some triangles are not right angled," if the one is false the other must be true. Nevertheless, "all A" is more opposed to "no A" than to "some A;" so that, if "contraries" are capable of union, much more must "contradictories." But the application of logical forms to this question is an instance of the fundamental error of Sir William's philosophy; namely, *that he takes the laws of comparison for the laws of thought.* Logic, in its "contraries" and "contradictories" is occupied with the *analysis* of thoughts, not with their *construction*. In this operation its distinctions are in their proper place. The centre is *not* the circumference; an obtuse angle is *not* an acute angle, etc. The maxims to which Sir William appeals apply to the comparison of these differences. His mistake lies in applying them as tests of the possibilities of constructive thought. The thought of the circumference excludes that of the centre, but both are indispensable to a circle. The thought of a right-angled triangle excludes that of an obtuse-angled triangle, but both are included in the thought of a triangle. That which logic separates, constructive thought must first bring together. How can it be supposed that the laws of these opposite acts should be the same?

traditions inherent in the conceptions of the "infinite" and "absolute," have been ascribed to the weakness of the human intellect, and the impossibility of its duly apprehending such elevated subjects, because men did not perceive that the same indefiniteness and contradictions enter into all our conceptions; as they must do, since this "infinite" and "absolute" are only names for the consciousness by thought of its own free, constructive nature, which knows no limits but such as are self-imposed, no conditions but those arising from its own operations, and imports into all its creations its own freedom.¹

¹ *Mr. Herbert Spencer*, in his work on "First Principles," carries this philosophy of negation to its extreme point, declaring that the knowable is only a manifestation of the unknowable (p. 122), and that "religion and science coalesce in the consciousness of an omnipresent incomprehensible power" (p. 99). The key to the solution of the subtle riddles by which this powerful reasoner strives to make reason strangle herself, lies in the conception that knowledge arises from the constructive action of thought manifested in the distinction and union of opposites. For instance, the most perplexing of them, the thought of the passage of motion into rest, loses its perplexity when we remember that the action of thought requires time, a consideration applied, in chapter iii., to solve the ancient puzzle of Achilles overtaking Priam. The perplexity vanishes also when we think of a motion returning into itself, of movement in an ellipse, the limit of which is a straight line.

Mr. Spencer says most truly that all knowledge is relative, whence he infers that there must be an absolute unknowable something beneath what can be known. But if the absolute is only a name for that which produces the relative, why may not the study of that which is produced disclose to us the nature of that which produces it? If, indeed, knowledge consisted, as Mr. Spencer supposes, in including smaller classes of facts in larger, his conclusion that the largest class must be unknowable would be irresistible (p. 73). But in this deduction he has confused *facts* with *thoughts*. *All facts* are individualities. There are no smaller or larger classes of facts, as such. The astronomer observes at various times certain bright bodies in different parts of the sky. He puts all these observations together in his mind, and conceives a solar system. In so doing he comprehends many facts under a general thought. But the observed facts do not therefore cease to be individual. That the conception truly expresses the action of a power realised in nature we admit. We believe the universe to be penetrated by general thoughts, thoughts of things according to their qualities or kinds; and that in *inducing* the general on the individual we do but *educer* what lies in that individual. But we can *observe* nothing but the individual. The generality ascribed by us to it is drawn from our own minds. To talk of general facts or truths in any other sense than as names for the constructions of our thought, is, therefore, to talk nonsense. And, since no limit can be assigned to this constructive power, the alleged proof that there must be an ultimate something incapable of being brought under it breaks down. The ocean of reality may be little explored, but the explorer need not fear an inevitable shipwreck.

On the other hand, the defenders of idealism have generally confused the necessity belonging to the action of thought, with a necessity supposed to belong to certain subject-matters thought of. They have treated ideas as if they were ready-made conceptions, constituting a natural revelation implanted in our minds; and have thus exposed themselves to the fatal objection, that, if so, all thinking men ought intuitively to perceive and distinctly to apprehend them. *Dr. Whewell*, for instance, in his valuable "Philosophy of the Inductive Sciences," undertakes to show that the ideas of space, time, cause, action, and reaction, etc. belong to the mental furniture given us by our Maker, which we discover and understand when we apply our minds to study the objects presented to our senses. But if these fundamental ideas lie ready formed within us, why can we not discover them by the study of our own minds, and thus construct systems of necessary knowledge, without appealing to the senses? *Dr. Whewell* gives no answer to this question. *Dr. M'Cosh*, in his "Intuitions of the Mind," replies, we cannot construct sciences from our mental intuitions, because these necessary elements of thought are *not* in our minds, but in the objects around us, whence our minds extract them. But how can our minds extract the necessary and unchanging from the study of the changeable? Again we get no answer. *Dr. M'Cosh* simply produces the thoughts, and asks, are they not unchangeable in their nature? and does not the study of the objects about us lead to the conception of them?

From the position taken in this argument, both questions are readily answered. We can see that, as *Dr. Whewell* affirms, necessary thoughts are supplied from our own minds, and not only extracted by them from the phenomena of sense. For the thoughts to which this character of necessity attaches, are involved in the process of thinking, a process inseparably entwined with all observation, though quite incompetent to supply its place. And

yet, as Dr. M'Cosh maintains, we may perceive this necessary element in the world of observation. For, if that world be constituted by a power acting according to the law of thought, it must be expected to reflect back to us those conceptions of space, time, relation, substance, cause, etc., which belong to the process of thought in ourselves, and attend on our geometrical conceptions no less than on our perceptions of natural objects.

Thus does the history of the Baconian philosophy confirm the conclusions drawn by us from examining the great stream of metaphysical investigation. The same law of thought which determined the succession of the systems founded on the belief in ideas, has determined the course of the investigations undertaken by the method of observing facts. The inquiry into the grounds of our knowledge made by this process requires the conclusions deduced from the results of the more consistent system, in order to escape from its own difficulties. The same result follows, from the perplexities attending the foundation of our belief in an external world according to the positions taken up by modern psychologists. We have already seen that they have refined away Reid's "invincible belief" in the testimony of sense, by arguing that we *can* be conscious *only* of objects in immediate contact with our bodies, and therefore *must* be mistaken in supposing ourselves to see, hear, or smell bodies at a distance from ourselves. We are told that we must believe bodies to be extended, because we feel them to be so; but are not to believe that we see any object, because it may be proved that what we call sight is only the result of certain sensations produced in our bodies by bodies at a distance from us. But we can prove also that extended bodies are composed of discreet particles, though to our touch their parts seem continuous. Why then are we not to apply Sir William Hamilton's rule, *falsus in uno, suspectus in omnibus*.¹ Why rely at all

¹ False in one thing, suspected in all.

upon a sense which can be shown to mislead us. That if we reject the testimony of this sense, as the psychologists would have us reject that of its companion senses, the whole system of psychological metaphysics will tumble about our ears, may be true. But what of that? We can believe in our senses without psychology.

Now if we regard thought as a process of construction, this difficulty also vanishes. Our theory will place all our sensations where our ordinary experience places them, in the same relation to the mind. Every sense furnishes materials for the constructions of thought, materials of unequal value indeed, and accordingly variously appreciated by thought, but all essentially similar; so that we use each in turn to correct the testimony of the others. To correct the testimony of sight by that of touch is a familiar act.¹ But we may correct touch by sight. "The same object," says Pr. Mansel, "may be experimentally shown to be felt as of different magnitudes in different parts of the body."² How do we know it to be the *same*, but because we see it? Again we habitually correct hearing and smell, by sight, in estimating the position of bodies. Yet we correct sight by hearing, when we infer from the humming of a bee's wings that they must be in motion, though we cannot see them move; and by smell, when we infer that a grain of musk must diffuse some substance around itself, though we cannot detect by sight,

¹ Hence we may answer the objection of an ingenious writer in the *Saturday Review* to the conception of necessary thoughts, namely, that if we lived in a world so constituted that *four* objects capable of being felt, always produced *five* objects capable of being seen, we should conclude that two and two made five. Our conclusion would really turn, not on the relation of two and two to five, but on the relative values of touch and sight, as a means of judging how many distinct objects were present. Such contradictory testimony might be perplexing, but that the perplexity would not affect our notions of number, is shown by the fact that we can actually produce the supposed effect in a much higher degree by a multiplying glass, without in any way affecting those notions. In fact, to appreciate the difference of the two impressions, we must have the thoughts *both of four and of five* present to our minds.

² *Metaphysics*, 82, 85.

even with the aid of the most delicate scales, any diminution in its bulk.

What we call the testimony of the senses is, in every case, a judgment, formed from an act of thought in giving unity to the impressions made on our faculties of sensation.¹ How freely thought proceeds in this task is shown by the history of physical science. This has consisted, first in criticising the primitive conceptions produced by the instinctive combinations of our perceptions; and then in substituting in their place other conceptions, formed by the conscious activity of thought; for instance, in place of conceiving a stone to fall, conceiving the earth to draw it,² in place of conceiving the sun to move, conceiving the earth to rotate, etc.

We have a constant witness to the same fact in the psychological puzzle of erect vision from an inverted image; which Kepler and Telesius explain by supposing the eye to follow the direction of the ray of light, or rather that of its centre; J. Müller by supposing the eye to judge of the relations of different parts of bodies, and thence to construct an upright world out of an inverted one. Here, as in every other case, thought judges from the data of sense. The same exquisite machinery which enables it to appreciate those minute differences in the direction of two rays, whence it estimates sizes and distances, must enable it to determine whether any ray comes into the eye from above or from below. Why should it refer the source of the ray to any other direction?³

¹ *How* our minds can perceive these impressions is a question quite distinct, and not affecting the present argument.

² When Newton said, of his theory of gravitation, *hypotheses non fingo*, he forgot that his conception of a stone being drawn to the earth by a force inherent in the *earth*, is itself an hypothesis. Aristotle explained the motion of the stone by a tendency inherent in the *stone*. Newton took his strong conviction of the truth of his hypothesis as a proof that it was a reality; as Copernicus did in regard to his conception of the motion of the planets round the sun. Humboldt, *Cosmos*, ii. 345.

³ For some judicious observations on this question, see Trendelenberg, *Log. Unter.* i. 498.

The feeling of certainty in our judgments about the objects of sense, depends upon the mutual agreement of the different parts brought together by the act of thought. When we can detect no want of unity, we are contented; when we become conscious that there are any phenomena outstanding, which we cannot draw into accordance, we become dissatisfied, and seek for some more perfect bond of union between them in another conception. But it is interesting to observe the entire agreement between our actual conclusions as to these objects and the operations of our reason. We judge with absolute certainty that all the objects of sense exist in space and time. And we find that the thoughts of space and time are so involved in the being of thought as to form the conditions of all its manifestations. We attach no such certainty to our sensations of color, sound, etc. Now these express only the relations of the objects perceived to ourselves and to each other. And we find that the mutual relations of the objects of thought admit of endless variation. If we are unable to explain *how* thought becomes conscious of sensation, we can at least show that the observed results perfectly accord with the results to be expected, if the world of sense had been produced by the action of our own power of thought.

The views to which these considerations lead agree with that maintained by *Professor Ferrier*, with great force of argument, in his "Institutes of Metaphysics," namely, that the condition of clear thought upon metaphysical subjects, is the separation of the two elements of knowledge, the knowing and the known; the intelligent "me," and the "not me" on which its intelligence is exercised. But between his position and that taken in the present work there is the difference, that he does not furnish any test by which the element of the "me" can be discriminated in the "not me." He argues that to think of a matter wholly devoid of this element, would be to think of a universe of absolute nonsense; and that, since the observed

universe certainly has not this character, the element of the "me" must be present in it. But until we can show that the "me" has a law of action, we have no means of advancing such an argument beyond a general probability. We cannot say what characters any observed phenomena ought to possess, if they do embody this element. So that the Professor's conclusion becomes only a forcible mode of stating that *faith* in the existence of a conscious principle of beauty, and harmony, and goodness, present in the universe with our own consciousness and intuitively discerned, which *Jacobi* upheld during the last century in Germany, and a host of able thinkers in England, France, and America teach at this day; neither denying the difficulties attending their assumption nor professing to solve them, but holding its rejection to involve far greater difficulties than its acceptance.¹

But the assumption of an intuitive faculty of *faith* is open to the difficulties affecting the assumption of an intuitive faculty of knowledge: namely, the uncertainty of its intuitions. This is the stumbling-block of the system through which *Victor Cousin* endeavored to bridge over the chasm between the philosophy of sensation and the philosophy of ideas, after the teachings of *Royer Collard*² and *Maine de Biran*³ had effected in France that transference of philosophical speculation from the outward to the inward, which the Scotch philosophy effected in England. The spell beneath whose magic the structure should spring up, lay in the "spontaneity" of thought; that is, in the intuition of a primitive act of the mind, by which we discern that unity, plurality, and relation are the three

¹ Among these writers, of whom *S. T. Coleridge* is the most celebrated in England, the Rev. *F. D. Maurice* deserves especial notice, from the peculiarity of contending, (1) that we have an intuitive idea of God, which enables us to recognize the person of Christ as the true manifestation of the Divine essence; (2) that without this manifestation, the idea of God could not sustain itself in our minds against the subtle distinctions of thought, but would always be liable to be lost in the idea of Nature.

² Lectures, 1811-1816.

³ 1796-1824.

elementary principles of that absolute reason of which the "me" and the "not me" are the necessary and correlative manifestations: a trinity where nature and humanity combine in God. The critical judgment demands a proof of the intuition; and that the demand can be reasonably made is fatal to the system. The intuition either degenerates into mysticism, and requires that its assertions should be received as a revelation, or is reduced to the condition of an hypothesis, whose truth must be tested by its power of explaining facts.

Now, the facts to be explained include the phenomena of thought, as well as those of sense. The progress of inquiry, by demonstrating the impossibility either of resolving our conceptions into mere reflections of sensation, or of converting our sensations into mere reflections of thought, reduces us to the alternative, either of admitting an absolute duality between mind and matter, the "me" and the "not me;" or of seeking a solution of the difference between them in some common principle to be educed from the study of each independently. This is the object of the present investigation. It appears also to be the object of *Mons. Comte*, and the adherents of the so-called Positive philosophy. They assume the material universe and man to result alike from the action of a power which always works by fixed laws; and study these laws in order thus to obtain a complete conception of the power whose action they express. And in this study they include the phenomena of the intellect, the will, and the affections, as well as those of the senses. But the history of thought shows us that man has been earnestly engaged for the last 2500 years, in doing for his own nature that which these philosophers would begin to do *de novo*. By his persevering attempts to find in himself principles of certainty, whence to account for the universe, he has brought to light the law of thought; and the Positive philosopher might as well attempt to explain the phenomena of the skies with-

out regard to the law of gravitation, as to explain the phenomena of the mind and their relation to the world of sense, without regard to this law of thought.

In the succeeding part of our investigation we hope to show that, by this law, that externality which mars the philosophy even of the ablest thinkers of this school, such as Mons. Comte, J. S. Mill, Herbert Spencer, and Alexander Humboldt, may be overcome. Astronomy is a "science achevée," says *Mons. Comte*, because it fully understands the law of gravitation. How gravitation is possible at all, the astronomer is not to ask. So *Humboldt* finds nothing more to say about the fundamental character of that Cosmos, of whose outward relations he has drawn so striking a picture, than that it results from "an ancient and inward necessity, which sways all the action of spiritual and material forces in eternally self-recurring circles periodically enlarged or contracted."¹ *Mr. Herbert Spencer*, again, deduces the universe from the differentiation and integration of a power of which he affirms nothing to be affirmable, but that it is an ever-persistent force.² And *Mr. J. S. Mill* seeks the ground of morality in a comparison of the consequences of this or that mode of action, on the agent and those on whom he acts.³

Mons. Comte has indeed endeavored to raise this "externality" into the principle of true philosophy; which, according to him, advances from theology, through metaphysics,

¹ *Kosmos*, i. 32, German edition.

² *First Principles passim*, see especially 235 and 488.

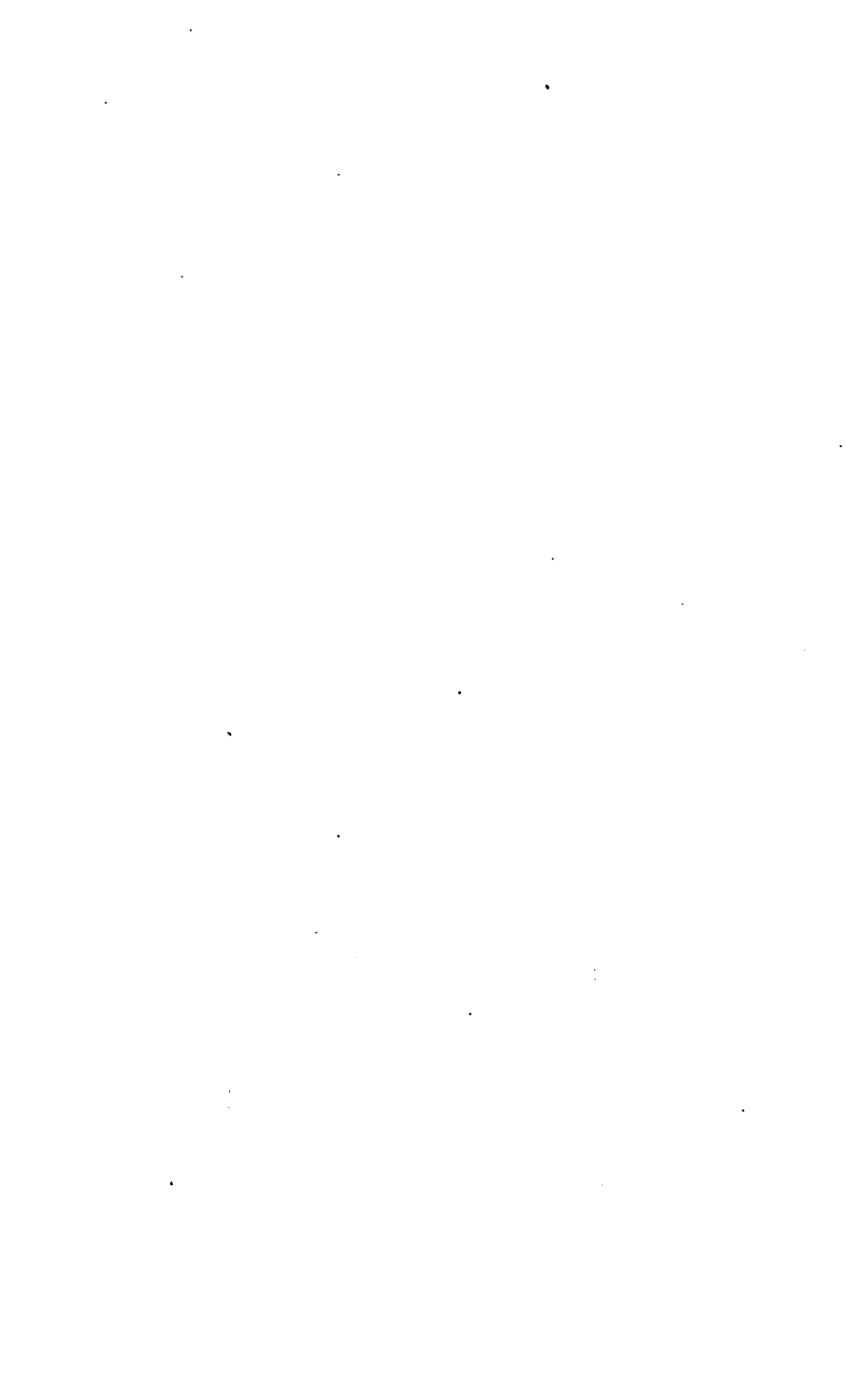
³ A process of the greatest value in determining *what* is moral; but when applied to determine *why* it is moral, involving a perpetual *conversio principii*: a transformation of the direct action *towards* the good of others, on which morality rests, into the *reflected* action of this good towards the actor, which turns self-sacrifice into self-seeking. Hence may be explained the contrast between the delicate yet forcible discrimination of Mr. Mill's criticism, when he applies his principles, as in his *Essays on Bentham and Coleridge*, and the feebleness of his deductions when he states the foundations of his system, as in his recent work on *Utilitarianism*. In the first case he is tracing an expansive force into its limitations, and does it admirably; in the second, he endeavors to make out that this expansive power is only a capacity for reflection.

to the conception of laws as the goal of thought; abandoning all search into the causes of these laws. We shall return to this statement again. For the present it may be observed, that all the laws on whose discovery the proof of the proposition is rested, were discovered through the opposite assumption. If men had always been contented to trace laws instead of searching for causes, we might still have been occupied in making lists of eclipses, instead of computing them; or in heaping epicycles on cycles, to account for the movements of the visible planets, instead of feeling our way by calculation to the detection of one unseen.

PART III.

THE DIVINATION OF THOUGHT.

Upon the world's great altar stairs,
Which lead through darkness up to God.



CHAPTER XI.

The Interpretation of Nature.

Our investigation has brought us to the conclusion, that the faculty of thought, of which we are conscious, has a law of action, whence it may be possible to compare the "me" of our consciousness with the "not me" of nature.

We establish the existence of this law on three grounds :

1. Because, by means of it, we can assign an intelligible meaning and logical connexion to certain thoughts, which have left their impress on all cultivated languages ; and which have this peculiar character, that while we are conscious of their presence everywhere, we can nowhere catch hold of them ; that they cannot be got rid of, and yet, when questioned, seem to melt into nothing ; a character suitable to thoughts expressing the action of thought, and to no other kind of thoughts.

2. Because we find these same thoughts, in the same order, forming the characteristics of a double series of systems of thought, extending over a period of two thousand five hundred years ; through which men have attempted to account for the universe upon two opposite assumptions :—1st. That the true reality is a physical Being. 2nd. That the true reality is a spiritual Being.

3. Because the results of this double series of systematic efforts is totally unintelligible if it be not referable to the secret operation of a law of thought pervading them.

For in each case the conclusion attained through these similar stages, is the opposite of that attained in the other.

Greek thought, setting out with the assumption of a natural reality, arrived at the conclusion that nature is only the robe of a spiritual essence. Modern thought, setting out with the assumption that nature is the robe of a spiritual essence, has ended in regarding this essence as inseparable from its robe. Now if the law of thought, deduced from our consciousness, be truly stated, the action of thought consists in setting over against itself an "other," or opposite of itself, in which it recognizes itself. Therefore Greek thought, beginning by identifying itself with natural power, ought to have ended, as it did end, in setting up the "other" of natural power, that is spiritual power, as the reality of nature. While modern thought, beginning with the opposite identification, ought to end in the opposite result, as it has done.

It is unreasonable to suppose such a succession of coincidences to be accidental. Therefore we are justified in treating the alleged law as a reality. But if so, the impression produced by the tendency of modern thought to transform spiritual power into natural power, must be greatly modified. We see that Mons. Comte's maxim, cited in the last chapter, describes not a universal law of thought, but only the action of thought, when, like modern European thought, it has begun by treating spiritual being as the sole reality. To Greek thought, in its eleven hundred years of progress, the converse maxim applies. If Mons. Comte had lived in the age of Justinian at Athens, instead of at Paris in the age of Louis Philippe, his method of induction must have led him to lay down as the basis of his Positive philosophy, the rule, that thought advances from the conception of natural law, through metaphysics, to theology. Now the course of Greek thought, from Thales to Proclus, is entitled to as much consideration as the course of modern thought, from Boethius to Hegel. Mons. Comte's celebrated axiom therefore, instead of expressing a great natural truth, is an assumption about

nature, founded on an imperfect acquaintance with the action of human thought.¹

¹ The conception of the progress of thought from the material to the spiritual, is replaced in Mons. Comte's philosophy by the theory that the thought of God has passed through the successive stages of fetichism, polytheism, and monotheism. But this theory, if applied to the history of religion, is inconsistent with facts, and if applied to that of philosophy is destructive of his main proposition that from theology men advance to science. The deeper knowledge of ancient religions now attained has shown that polytheism arose gradually, not as a consolidation of fetichistic deities, but by the converse process, from the tendency to localize and subdivide the conception of the Divine, by grouping new gods round the primitive centres of unity; as, in the middle ages, the Divine Being became girded with a band of saints, who were the local embodiments of its action. While, if the philosophy of Ionia is to be regarded as a form of fetichism, Mons. Comte's Positive philosophy must submit to be regarded as another form of it.

The succession of thoughts indicated here is recognized by Zeller, in his "Philosophie der Griechen" referred to above (I. 111-120, and 93, 94); and is explained by him through the supposition, that the Spirit (*der Geist*) had a tendency, (1) to assert its unity with nature; (2) to distinguish itself from nature; and thus, (3) to produce a dualism, which formed the characteristic of medieval philosophy; but which, (4) in modern thought has been gradually overcome. But this theory is open to grave objections. 1. If *der Geist* means some superhuman power manifested in and through human thought, it is inconceivable that such a power should take so roundabout a course, to an end which must be supposed present to it from the beginning. 2. If, on the contrary, *der Geist* means only the thought of man, there is an unexplained break in the continuity of development, at the point of transition from ancient to modern thought. There is a fundamental difference between the philosophical position of the medieval thinker, and that of the neoplatonist. In Neoplatonism the *philosopher stood above the priest*. He drew the ancient religious systems into his own sphere as a means of accounting for human history, but without relinquishing for a moment the appeal to his own reason, as the witness and ultimate judge of truth. In Medieval Thought the *priest stood above the philosopher*; who limited the application of his reason to the illustration of mysteries not to be questioned by it. To refer to the distinction previously made by us, thought had passed from its *objective* to its *subjective* phase. Now Dr. Zeller's theory does not show how it came to do so, while our theory does show this.

That Greek thought prepared the way for that Christian thought, destined, as we believe, to form the foundation of a permanent and universal civilization, we do not contest. We apprehend that the philosophy of Greece exercised on the middle ages an influence akin to that exercised by Roman law on medieval legislation. The Christian world carried in it a ferment of thought, derived from that past in whose closing epochs it grew up. In due time this ferment displayed itself according to the law of thought, penetrating and vivifying the religious traditions, which without its action would have become corrupt; and gradually transformed into truths of the reason what at first were only instincts of feeling. Thus arose a new development of philosophy, having a direction opposite to that taken in the ancient world; and ending in the manhood of thought, with that conception of the unity of the spiritual and material, by which the childhood of thought began: though with the difference due to the distinction between the child and the man. But this process cannot be

From such errors we are saved by appreciating the law of thought in its entirety ; and are placed in a position to do for the principle of thought, what we do every day for the thoughts derived from the action of that principle—namely, to apply the knowledge gained from the study of ourselves, to the interpretation of nature. That our knowledge of the objects of sense arises from the translation of phenomena into thought, must be admitted as a fact, even by those who, as a theory, suppose the thoughts used in the process to be originally reflected from the nature they interpret. Whatever may be the source of our power of thought, its action is to associate the impressions made on our senses with certain conceptions intelligible to itself ; and thus to read them into meaning. When we decypher a letter ; when we disentangle in thought the forms of an entangled mass ; or when we decypher the movements of the planets ; in every case we repeat an operation precisely similar in its character, though requiring very various degrees of exertion and skill. It may not cost us eight seconds of thought to assign an intelligible sense to the irregular scratches of a careless friend, who writes a bad hand. It cost Kepler eight years of unremitted effort to discover a conception by which to make the irregular movements of the planet Mars intelligible to himself, and all subsequent astronomers. But, in each case, the operation consists in finding a conception which will include all the appearances, and thus give them unity. When we have found it, the writing, whether of blotches of ink on paper, or tracks of light in the skies, is interpreted—that is, translated for us into thought—and then only does it become part of our knowledge.

Now the statement of the law of thought is as much a conception as any other thought. Therefore it is capable of resolved into a single continuous progress of philosophical research. It is a double action ; whose unity cannot be explained out of itself, but, like the double movement of the earth, in her course round the sun, must be accounted for by reference to a centre of action greater than its own.

being applied to the interpretation of natural phenomena, with as much propriety as any other ; as much, for instance, as the conception called by us the law of gravitation. That is to say, having ascertained, by the study of the law, what character any objects ought to possess, if they are produced by a power acting according to this law, we may inquire whether these objects do possess such a character ; and, if we find that they do, a presumption will arise that the power whereby they are produced thinks. Occam's rule, *entia non sunt multiplicanda*, is one of which the sound sense has been affirmed by the whole course of science. The scientific thinker justly smiles at the suggestion of Mr. Ward, in his "Ideal of a Christian Church," that the planets may be moved in their courses by angels, who conform in all respects to the action of gravitation ; which leaves them nothing to do. But he would fall into a similar absurdity if, finding the phenomena of nature to be such as ought to result from the action of a thinking Being, he nevertheless ascribes them to the action of some unknown power, which *acts like a thinking Being, but without thinking.*

CHAPTER XII.

Inorganic Being.

IN order to apply the law of thought to interpret natural phenomena, we have first to determine what characters objects produced by a power acting according to this law ought to manifest. Our previous investigation enables us to give an answer to that question. Such objects ought to exhibit two great characteristics :—

1. They should be unities arising from combinations of opposites. 2. They should be constituted by ideal judgments ; in virtue of which lines of diverse motion are united into individualities.

Now unquestionably the universe, so far as it has been revealed to us by science, fulfils the *first* of these requisites. The solar system, to which at present our *knowledge* is limited, is formed by the opposition of one luminous, heat-emitting centre, to many non-luminous, heat-receiving bodies, carried round it. The same character appears in the relation of the planets to their satellites, and to each other. The planets constitute two opposed groups, separated by a central group of asteroids.¹ The exterior groups consist of *four* large planets, each accompanied by many satellites ; one, namely, the *second* from the central group, being distinguished from all its companions by the peculiarity of possessing a ring. The interior group consists

¹ Sixty-two are enumerated in *Cosmos*, v. 116.

of *four* small planets,¹ without satellites, excepting one,—namely, the Earth—the *second* from the central group, which is thereby distinguished from its companions.

Thus is the law of unity produced by opposition written in the skies. It meets us also in the general constitution of the earth. (1) The earth is a mass of land and water, surrounded by an atmosphere consisting essentially of two opposite constituents—gas and vapor; the gas being formed of two elements—oxygen and nitrogen—opposed in every character, and existing in a state of mechanical diffusion; the vapor being composed of two elements—oxygen and hydrogen—also opposed in their characters, but intimately united. (2) Viewed from north to south, the earth presents two hemispheres, in each of which a polar zone of cold is opposed to a central zone of heat. One of these poles is immediately surrounded by water, within a belt of land; the other appears to be immediately surrounded by land, within a belt of water. Viewed from east to west, it offers two hemispheres; one where water predominates over land; the other where land predominates over water. (3) The land divides into two great masses opposed in every way. In the Old World the great mass of land is central; in the New, the centre shows the smallest mass. The principal lines of elevation run, in the first, from east to west; in the second, from north to south. The great secondary lines of elevation are nearly perpendicular to the principal in the one; and parallel to, or gently inclined to it, in the other.² Again, the outlines of the two con-

¹ Astronomers now suspect the existence of a fifth inner planet between Mercury and the Sun. But so there may be a fifth outer planet beyond Neptune. Or this planet may belong to some internal system of opposition, existing within the zodiacal ring.

² See papers by Mr. Charles Wood in *Philos. Mag.* for March, April, and May, 1862, on the Distribution of the Land and Sea in the Secondary and Tertiary Period. The Parime mountains in S. A. are an apparent exception to this rule; but these exhibit the principle of opposition in a way of their own. They correspond in direction to the Atlas mountains in Africa, but differ from them (1) in being a secondary instead of a principal range; (2) in being situate on the east side of the continent, instead of on the west.

tinents contrast in themselves, and with each other. In each, one side is broken by great indentations and projections, while the other is comparatively regular. The most regular side of the Old World is on the east; the most regular side of the New World is on the west.¹ The two irregular sides are so opposed that the nose of Africa might almost fit into the jaws of America. The two regular sides diverge at opposite angles. Again, within each mass, north and south are contrasted. The north has a tendency to spread into broad surfaces; the south to contract into promontories. Each great continent divides into two masses, of which in each case the southernmost is the smallest: but, in the New World, the two are nearly equal; in the Old, the northern greatly exceeds the southern. In each case the great lines of elevation attain unequal heights in the two masses; but in the Old World the greatest elevation belongs to the northern and larger continent; in the New World it belongs to the smaller and southern continent. In each case the land dips; in the one continent from a single great line of elevation to the sea; in the other from a double line of elevation to the sea and the land. In the Old World the first character belongs to the northern, and the second to the southern hemisphere. In the New, the relations are reversed.²

Not less striking is the opposition disclosed by geological research in the processes whence the solid crust of the earth has arisen. The 1st operates from within, through the action of fire, producing unstratified rocks, rich in all

¹ In this comparison the line of Asia is traced along the peninsula of Kamskatchka and the Japanese isles to China, excluding the interior seas, as, on the west, we exclude the Baltic, Mediterranean, and Black Sea.

² How this opposition is produced we do not attempt to explain. But the first condition of solving such a problem is that the opposition be recognized. Further oppositions may be traced in the double appendages to the great Asiatic continent formed by Africa and Australia, contrasted with the single appendage of South America to North America; and in the opposite characters of the isthmuses of Suez and Darien, and of the Mediterranean Sea and Gulph of Mexico.

varieties of mineral, while destitute of organic remains; and acts apparently in alternate periods of energy and repose. The 2nd operates from without, through the continuous action of cold and heat, storm and ice, upon pre-existing structures; and forms stratified masses, rich in organic remains, though poor in mineral substances, or containing them in a dispersed instead of in an aggregated condition. And these opposites are united by a 3rd process, where the watery deposit is metamorphosed by heat into a crystalline condition.

Thus does the general constitution of the earth illustrate, in manifold shapes, with the rich variety of nature, the first characteristic of the law of thought. If we turn from its great features to its constituents, their familiar division into gases and metals, acids and alkalis, testifies that the law of opposition does not abandon us. But instead of pursuing this topic into detail, it will be more useful to proceed to the *second* law, of which the evidence is to be found in the elements of being.

Now that all bodies consist of parts possessing distinct unvarying properties, whose differences constitute the conditions and determine the character of their union, is certain; chemical science rests upon such assumptions. Further, it is certain also that the relation of all these ultimate parts to each other, is intimately connected with *motion*. Modern science unmistakeably tends to reduce all natural phenomena to different expressions of *one* force. Light, heat, electricity, magnetism, chemical action, crystallization, mechanical action, pass into each other by such insensible gradations, that their action cannot be thought of as essentially distinct. And the thought where all the thoughts composing the manifold solutions of scientific problems seem to meet, is the conception of self-limiting or *vibratory movement*,—of motion returning into itself; a conception written in light on the skies, and whence the idea of an orderly constitution of the universe seems to

have arisen.¹ In other words all science, points to the thought that *bodies are produced by the realization of ideal judgments*, that is, by the combination of opposite movements or directions of force into indivisible unities constituting their ultimate atomic parts.

But, up to a recent period, there remained outstanding and apparently irreducible to any intelligible conception, the power of attraction, manifested in the forces of gravitation, electricity, magnetism, chemical action, cohesion, those mighty magicians through whom Nature works her wonders. Here lay the stronghold of that "externality" already noticed, the bane of positive science. For, was it not clear that in this power the secret of Nature consisted? And was not this power, though inconceivable in itself, capable of being understood in its laws of action? And was not this fact the conclusive proof that the intellect of man must content itself with studying the laws of Nature, and give up all hope of an insight into the mysteries of her being? From this dilemma we are delivered by a brilliant achievement of Professor Challis.²

By the aid of his mathematical reasonings we are now able to resolve all material substances into two great oppo-

¹ See Humboldt, *Cosmos*, i. 62. "All hypotheses hitherto formed to account for the varied phenomena of nature have resolved themselves into motion. In vain the mind has sought to comprehend, or the tongue to explain, natural agencies by any other means than motion." Grove, *Correlation of Force*, 37: first edition. "One primal essence pervades all natural phenomena, and that is motion." Tyndall, *Vacation Rambles*, 1861: 68. That this motion is vibratory, that is, returns into itself, is not stated in these passages. But it is necessarily implied in the notorious fact, that all the phenomena thus explained arise within bodies occupying defined spaces. If the motions producing heat, for example, were continuous movements of the parts of bodies away from each other, the bodies must fall to pieces. In an able article on Force, in the *Cornhill Magazine* for October, 1861, the qualification wanting in these statements of Prof. Tyndall and Mr. Grove, is expressly supplied, and all natural phenomena are resolved into "vibration, or the development of equal and opposite activities," giving as "the sum total of force 0, or a present infinity." And Prof. Tyndall, in his "Lectures on Heat," recently published, continually refers to the atoms of all substances as "swinging" in ether.

² See a series of papers in the *Philosophical Magazine* from November, 1859, to January, 1861. The Professor resumed the subject in April, 1862.

sites : 1, that which *produces* movement, the material atoms strictly so called, or *that which may be weighed*; 2, that which *propagates* movement, the ethereal atoms, *which cannot be weighed*, because all *weight arises from the pressures* produced upon the material atoms, through the *reaction* of the *movements* communicated by them to these ethereal atoms.

The Professor has demonstrated that a common origin for the phenomena of attraction and repulsion may be deduced from the conception of vibratory movement. The material atom, by its proper motion, presses on the ethereal. The pressure produces waves flowing from each centre of movement. Now, so long as the breadth of these waves is *less* than that of the atoms struck by them, they will urge these atoms apart. But so soon as the waves, by combining with each other, become *broad*er than the atoms, there arises this beautiful result : *the direction of the pressure changes its sign*. Instead of acting from the centre outwards, it will act from the circumference inwards; so that, instead of pressing the atoms asunder, it will press them together. The *repulsion is converted into attraction*; and thus attraction passes from an inconceivable mystery into an action perfectly intelligible.

Nothing can exceed the admirable simplicity of this conception; among whose merits must be enumerated, that its two fundamental assumptions, namely, (1) the existence of an ether, that is a substance destitute of weight and perfectly elastic, and (2) the intimate connexion of all natural phenomena with recurring movements, have been made independently by the prophets of science.¹ It adds only the suppositions, (1) that the

¹ Hence they are the foundation of the Rev. T. R. Birks' Theory of the Universe, in his recent able work on "Matter and Ether." But if we ask what matter and ether are in themselves, we obtain from Mr. Birks, as to the ether, no answer; and as to the matter, an hypothesis quite inconceivable. Whereas, Prof. Challis' theory admits of intelligible conceptions as to both matter and ether. See, on this point, chap. xviii.

material atoms are larger than the ethereal ; (2) that they are spheres, or at least spheroids or ellipsoids approaching spheres in form ;¹ (3) that their inertia, or resistance to motion, varies as their size.²

This theory (1) disposes in regard to the ether, of the question whether or not, it is not condensed round the sun.³ (2) It removes the difficulty, urged by Dr. Faraday, as to what *becomes* of attractive force when it is not exerted in the form of gravitation, *i.e.*, when there is no body present in any particular spot to be attracted? For the theory shows that the force always exists in the shape of oscillating movements, manifesting itself as an *apparent* attraction when some material object checks the progress of the oscillations. (3) In like manner, it explains that mysterious rapidity of propagation, "demonstrably more rapid than that of light itself," which Sir J. Herschel notices as one property of that "mystery of mysteries, gravitation."⁴ For as the oscillatory force exerted on each material atom is always present, though constantly varying with the distance of the atom from the centre of oscillation, the slightest change in the position of any atom will be accompanied by a corresponding variation in the pressure affecting it.

But how are these atoms constituted? Unfortunately for the success of his theory, Professor Challis, misled by

¹ That is to say, (1) a form in which length, breadth, and depth are equal ; (2) the opposed forms of—the spheroid, where the breadth surpasses the length, —and the ellipsoid, where the length surpasses the breadth, to which the depth is in both cases equal.

² To explain electrical and magnetic phenomena, Professor Challis introduces other hypotheses, which, whatever their merit, must not be confused with his deduction of attractive and repulsive forces from the movements of the bodies attracted or repelled. The recent report of the Astronomer Royal for 1863 contains an interesting confirmation of one of these hypotheses, in the suggestion that, "as a general theory of magnetic storms, the idea of attraction is to be abandoned, and that they are to be referred to *currents* of a magnetic ether, whose movements are closely analogous to those of air, the vertical movement of which occurs in but few places, but in those places is excessively violent."—"The Reader," June 20, 1863, p. 614.

³ Herschel, *Outlines of Astr.*, 579 ; Humboldt, *Cosmos*, iii. 567.

⁴ Good Words, 1863, 274.

his reverence for Newton, assumes his atoms to be impenetrable, indivisible, inconceivable, motionless forms, in order to set them vibrating by some wholly inexplicable force. But this supposition is not only not required by his theory, but is inconsistent with the facts of crystallization. According to Professor Challis' assumptions, the elemental centres of force are symmetrical in their action on all sides. Why then do they group themselves in definite lines of direction when they approach each other closely? The Professor gives no explanation of this peculiarity. But, if we take one step further than he has done, and assume these elemental atoms to be unities of opposite movements, expressed by curves diverging from central points or axes, and returning into themselves, the inconceivable atom will become the name for a perfectly conceivable combination of forces. At the same time we shall obtain an easy explanation, (1) of the differences between ethereal and material atoms; (2) of the peculiarities of crystallization; (3) of chemical action.

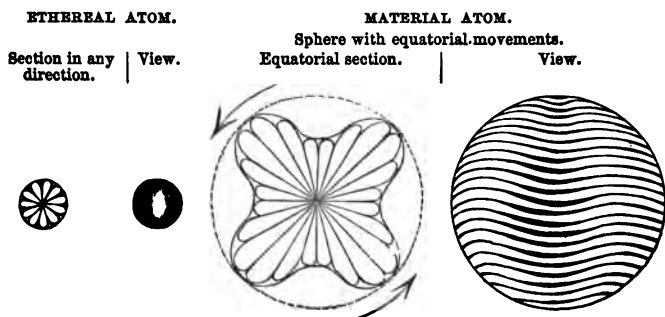
(1) The ethereal atoms, being perfectly elastic, and possessing no special action of their own, must be conceived to be formed by movements emanating from central points in all directions with perfect symmetry. The material atoms may be supposed to include spheroids and ellipsoids, as well as spheres; and the movements of their parts to spring from central lines instead of central points, and to constitute curves of unequal lengths, so that some may form projecting surfaces, and by coming into contact with the ethereal atoms, around them in recurrent pulses, produce those undulations whence repulsions and attractions would arise.¹

(2) These different movements would produce directions of more or less easy access among the different atoms,

¹ The accompanying figures may aid in illustrating the kind of action supposed by us to take place:—

and thus give rise to the phenomena of crystallization.¹

(3) The movements might be such as to cause currents of ethereal atoms circulating in different directions round the material ; whence, according to one of Professor Challis' theorems, there would arise pressures, urging the atoms to or from each other as these currents conspired or conflicted, so as to occasion attractions or repulsions between atom and atom, as is required to explain the laws of chemical combination.² At the same time this conception of atomic constitution clears up one of the deepest mysteries connected with attractive forces : namely, their apparent inconsistency with the great law of the *conservation of force*. The power of attraction possessed by each material body is known to be limited. How, then, is it not used up ? To



The elliptical curves are supposed to advance in the direction of the arrows ; whence the surface of the material atom would appear to be continually traversed by ridges or waves, rotating round it and producing corresponding movements in the ethereal atoms adjoining them. It will be understood that this illustration is only one case of many varied combinations of the spherical, spheroidal, or ellipsoidal movements, which we conceive material atoms to comprise ; and which the study of crystalline forms and chemical actions may ultimately enable us to discover, at least approximatively.

¹ A well reasoned explanation of crystalline forms by means of combinations of spheres, spheroids, and ellipsoids, will be found in a paper by Mr. Forster, *Philos. Mag.* (4th Series) 108. His suppositions as to the origin of the attractive power must be modified in adapting his explanations to the present theory, but this does not affect his exposition of the directions to be assigned to the lines of attraction or repulsion.

² See Hydrodynamic Equation, in *Theory of Magnetic Force*, *Philos. Mag.*, February, 1861.

say that every *attracting* substance is also *attracted* by the surrounding bodies, does not solve this difficulty. That B draws A in the direction A—B, cannot add to A's power of drawing B in the direction B—A. How is it, then, that this finite power of attraction is capable of being perpetually exerted without exhaustion? The question is readily answered, if the attraction of A on B is only the reflection of such motions of A's own parts as we have supposed. *For since the direction of these motions on one side of A will be opposite to their direction on the other side, the reaction of the pressures produced by them upon the ether will be in opposite directions, and will at every instant restore on one side of the atom the power expended on the other.*¹

¹ The minute differences of form and movement involved in these suppositions, do not in any way affect Professor Challis' demonstrations, which depend upon the relation between the breadth of the waves and that of the atoms. We may satisfy ourselves by throwing a stone into water, that all differences in the origin of the waves caused by it, due to any irregularities in its shape, merge at a little distance into a series of concentric rings, as the Professor himself observes. (Philos. Mag., Feb., 1860; paper on Molecular Force, § 2.)

The present author regrets that his acquaintance with the higher branches of mathematics does not enable him to pass any judgment on the processes of investigation employed by Professor Challis. The fact that the Professor's fundamental equations have been for some years before the mathematical world, without calling forth any refutation, is a strong argument in their favor. But the "pearls of analysis," to use a happy illustration of Sir John Herschel, should always be "strung upon a thread of common sense." We venture therefore to state some considerations elucidating what seems to us the common sense of Professor Challis' reasoning. Since every wave involves an equal movement in opposite directions, it appears at first absurd to suppose that a system of waves can produce a permanent motion in any direction. The secret of their so doing lies in two properties, (1) the breadth of the waves, (2) the circular form belonging to them. This will appear from the considerations following:—

1. Waves by which movements of translation to or from a centre are produced must be caused by oscillations directed to or from that centre.

2. The translating force of such waves *towards* the centre, must be due to the reaction against the impediment to their passage caused by the object moved.

3. If the breadth of such a wave is *less* than the diameter of the object on which it impinges, the action of the wave on the side opposite to that whence it approaches, must be either null, or so much less than its action on this side as to leave a balance of force directed outwards.

4. If the wave is *broader* than the diameter of the object it will act alternately on either side of it in opposite directions.

5. Now the object will give rise by its resistance, to a series of oscillations spreading *outwards* from itself; and these oscillations will *conspire* with the

The theory of the nature of atoms proposed here rests upon reasons quite independent of a reference to the law of thought. Yet it amounts to this, that *each atom would be the embodiment of an ideal judgment*. That is to say, each atom would be constituted by that kind of action which our minds must produce, if we could give to our thoughts the power of occupying space.

Thus does scientific inquiry into the probable con-

movements of the original wave, on the side of the object furthest from the centre, but *counteract* them on the side nearest the centre. They will therefore tend to *increase* the reaction or impulse *towards* the centre, and *diminish* that *from* the centre, and thus will leave a balance of force directed *to* the centre; and the difference between these effects will continually increase as the centres of movement approximate, because a larger proportion of the total force produced will combine or conflict.

These considerations make intelligible the relation between gravitation and molecular force, which, according to Professor Challis' theorems ought to be much the strongest of the two, without driving us to such hypotheses as the one to which Mr. Birks is driven in order to escape from his own assumptions, namely, the hypothesis that molecular attraction increases much more rapidly than in the inverse ratio of the square of the distances between the attracting and attracted centres; in other words, that a direct force emanating from a centre can vary more rapidly than the area of the space over which it is diffused. The waves whence the action of gravitation arises, being formed by the combination, at sensible distances, of movements originating in innumerable centres of motion, can represent only so much of the original movements as has not been neutralized by internal opposition in the neighbourhood of the centres whence they originate. It is therefore perfectly conceivable that the gravitating force exercised by, say the earth, upon an atom placed at a small distance from any one of these centres, may not be more than equal to the force exerted upon it by the rapid succession of small waves originating in this centre. Let this distance be $\frac{1}{1000}$ of an inch from such a centre, and call the molecular force M, and the earth's gravity G; then at $\frac{1}{1000}$ of an inch, $M = 4 G$; at $\frac{1}{4000} = 16 G$; at $\frac{1}{8000} = 64 G$; at $\frac{1}{16000} = 256 G$. To this rate of increase, add the pressure produced on any two or more atoms, through the relations of the currents caused round themselves by their own movements, and we obtain forces fully adequate to meet the enormous demand for power made on molecular action by Mr. Birks or Professor Tyndall. See Matter and Ether, 24; Lectures on Heat, 79, 145.

Another difficulty, very staggering on Mr. Birks' theory, disappears before the view of attraction taken by us, namely, the difficulty of conceiving how any aggregation of material atoms could move through the ether at all, if, as he supposes, it be always pressing upon each atom with the enormous force due to its elasticity; a force calculated by him, from the relative velocities of light and sound, as = $18\frac{1}{2}$ billions of lbs. on a square inch (p. 14). For if, as we suppose, the pressure of the ether on an atom be caused solely by the movements of the parts of that atom, and the aggregation of those atoms with all motions consequent upon it is a result of the pressures thus occasioned,

stitution of those elementary forces whose effects we perceive, accord with the conclusions indicated by our examination of the great phenomena manifest to our senses. We will follow the theory marked by a result so striking a little more into detail, by tracing the relations which it appears to point out between gravitation, light, heat, and chemical action. Every movement of the ethereal medium may be resolved in two planes at right angles

these pressures must merge into the originating movements; or, if distinguishable from them, can appear only as a very small resisting force, due to the difference of the pressures exerted in different directions.

It follows from what has been stated that if the amounts of motion produced by two atoms are equal, their inertia, *i.e.*, their capacity to resist motion, will depend on their size; for this resistance will measure the difference between the action on their surfaces of a wave movement directed *towards* a centre, and of the corresponding movement directed *from* that centre. Our theory is therefore consistent with the hypothesis adduced by Mr. Tyndall in the valuable and interesting work above cited (p. 142), that "all elementary actions, great or small, light or heavy, possess, when, at the same temperature, the same amount of the energy, which we call heat, the lighter atoms making good by velocity what they want in mass."

That tendency to separation, to which Mr. Tyndall, following Sir Humphry Davy, ascribes the action of gases (p. 62), is also a consequence of the constitution of atoms, if it be such as we have supposed. For the larger waves, whence molecular attractions arise, being formed by the union of many small waves, in consequence of certain atoms being accidentally nearer to each other than to any other atoms, must disappear when these unions are broken up, leaving behind their constitutive wave or heat elements, whose direct action is separative. In fact, the conceptions of the internal constitution of atoms assumed by us, have a strong analogy to those suggested by Sir H. Davy, and apparently accepted by Mr. Tyndall (p. 62, 67); only, in place of supposing a motion of the atoms round their axes, we suppose rotatory motions of the parts of these atoms, springing from central lines of movement,—a supposition which carries with it the explanation of the phenomena of crystallization and chemical action, without the aid of any additional hypothesis. It is consistent with this supposition to conceive that the circuits performed by the moving parts of an atom may be increased when it is free to move, while their velocities are proportionably augmented, and thus those effects may be produced which Mr. Rankine ascribes to the centrifugal force attending the rotatory movement of atoms. *Philos. Mag.*, 4th Series, x. 35. The formation of molecules through the differences in relative position of different atoms, alluded to above, is elucidated by the experiments of Professor Tyndall on the thawing of ice, which lead him to conclude that "there seems to be no such thing as absolute homogeneity in nature." (*Lectures*, 314.) We notice this circumstance because the absence of homogeneousness seems to us required to make Professor Challis' explanation of molecular action conceivable; though it is not alluded to by him. See *Philos. Mag.*, Feb., 1860, p. 89.

The relation between the theory of Professor Challis and other hypotheses as to the constitution of matter, is considered in chap. xviii.

to each other; one along which the line of movement travels, the other perpendicular to it. According to Professor Challis's theory, the action of gravitation is due to oscillations in the first, or horizontal plane. The phenomena of light have for some time past been commonly attributed to oscillations in the second, or perpendicular plane. These movements, therefore, are opposite in their character. They are also apparently opposed in their source: the *first* originating in the normal action of the elemental bodies; the *second*, so far as we can trace them, being due to sudden changes in their condition, constituting a succession of shocks. Now, the motion of the ethereal atoms affected by each of these shocks, so far as it fell into the horizontal plane, would merge in the oscillations producing attraction; while, so far as it took place in the perpendicular plane, it must tend to return to repose by a series of oscillations gradually decreasing. If the shocks were repeated, there must thus arise systems of oscillation, producing nodal points with intervals of oscillatory movement, analogous to those produced in the air of an organ pipe. Now, the relations of heat, light, and chemical action, manifested by the solar beams, are such as would naturally result from such an action. Its heat is now generally referred to vibrations longer and slower, and its chemical action to vibrations shorter and quicker, than those which constitute its light. But, according to the conception explained above, if we take vibrations of the magnitude and slowness belonging to rays of heat, *within* these would be developed the shorter movements constituting color, and *within* these, again, the yet shorter vibrations producing chemical action; after the analogy of the deeper and shriller notes produced by the blast of an organ pipe. And, as in that case, the fundamental notes may be obtained by a slow steady blast, without the higher notes,¹

¹ Mrs. Somerville, Connection of the Physical Sciences, 164, 5th edition.

so slow vibrations of the ethereal medium might produce heat without producing light.¹

The consideration of the elemental constituents of bodies leads our thoughts from results to means; and thus, to the celebrated hypothesis of the growth of the solar system out of a mass of so-called nebulous matter, illustrated by Laplace and recently defended with great ability by Mr. Herbert Spencer.² To discuss the arguments in favor of, or in opposition to that hypothesis, would demand more space than we can devote to the subject. Suffice it to remark, that the hypothesis is the only probable explanation yet given of the remarkable phenomena exhibited by the solar system, and should be discussed on its own merits as a conception adduced to give unity to certain facts, not as a substitute for the thought of creative power. Viewed in this light, as means to an end, the constitution of material atoms suggested above perfectly accords with it. For the simplest mode of orderly opposition in a primitive mass of atoms, would be an arrangement in rings alternately of greater and less density, distributed round a central point. But such an aggregation of centres of motion must produce a tendency in the whole mass to rotate, unless the active forces were equally balanced on either side of a plane passing through the centre at right

¹ According to this view, that action of heat which keeps the elemental parts of bodies apart arises from vibrations at right angles to those which operate upon other bodies in transmitting heat: a difference of origin accordant with those differences between the permanent and acquired heat of bodies which observation discloses, and which perplex the theory of heat. Mr. Birks contends (*Matter and Ether*, 73), that the vibrations which cause radiant heat are direct as well as transverse. The supposition is consistent with the present theory that the immediate action of such vibrations is to produce attraction. For attractions proceeding from different centres must tend to pull bodies to pieces; and this is notoriously the action of heat. From experiments upon the action of the oxyhydrogen flame, it appears probable that the production of the undulations whence light and chemical action arise is due to the presence in the flame of particles of solid matter (Dr. Miller's *Lecture at the Royal Institution*, March 13, 1863). Thus the circle is complete. The falling together of the material atoms, whose union produces chemical action, gives rise to heat, which destroys that union, but by its destruction develops a system of movements which reproduce the action destroyed.

² See *Westminster Review* for July, 1868.

angles to the surface. Thus would arise that centrifugal force, in whose opposition to the force of attraction lies the secret whence the ever-changing combinations of the solar system derive their beautiful stability; while there would be developed that opposition of the central sun to its encircling planets, which forms the first link in our chain of correspondences between the law of thought and the phenomena of Nature.¹

¹ On the question recently mooted of the supply of light and heat from the sun, we may observe that it does not appear necessary to rely upon the action of bodies external to the solar body, and falling into it. If light and heat are produced by the shocks given to the ethereal atoms by the material in falling towards each other, any constitution of the sun which would keep up a free motion among its parts, would keep up the supply of light and heat. Now, that appearances in the sun indicate the existence of such a constitution can scarcely be questioned, since Mr. Nasmith's remarkable discovery that its photosphere is composed of enormous leaf-shaped bodies, crossing each other, and possessing such a degree of solidity as enables them to retain constant forms. "These bodies," says Sir John Herschel, who estimates their size at not less than 1,000 miles long by 200 broad, "whatever may be said of the dashing of meteoric stones into the sun's atmosphere, are evidently the *immediate sources of the solar light and heat*, by whatever mechanism or processes they are enabled to develop and, as it were, elaborate these elements from the non-luminous fluid in which they appear to float."—(Good Words, April, 1863, p. 282). He adds that he "cannot refuse to consider them as *organisms* of some peculiar and amazing kind," possibly partaking of "vital action," which "we know, is competent to develop both heat, light, and electricity." The coral reefs of our own earth, which have been described as the work of gigantic animals, may help us to some conception of such beings. Now we are certain that they must be exposed to violent agitation during the formation of the spots on the sun's atmosphere. Of one of these spots Sir John Herschel calculates, "that the edges must have approached each other at the rate of 1,000 miles a day for six weeks continuously."—(Outlines of Astronomy, § 386. See also Humboldt, Cosmos, iii. 382, 486.) And that the spots are connected with the production of light and heat, is shown by the remarkable "luminous appearance like a cloud of light, far brighter than the general surface of the sun," seen by two independent observers to "break out in the immediate neighbourhood of a great spot," on the 8th September, 1859, and "sweep across the sun;" a phenomenon accompanied by a vast magnetic storm upon the earth.—(Good Words, Ib. 281). To what depth this agitation extends, or how dense the material agitated may be, we do not know. But, since the force of gravitation at the sun's surface is to that at the surface of the earth as 27.9 to 1 (Herschel, Outlines, § 450), the intensity of the shocks communicated by the movements of the material atoms composing that surface to the ethereal atoms, must be proportionably augmented; and thus the sun's atmosphere may be a self-restoring store of light and heat, adequate, when reinforced by the obscurer rays generated in the central mass, to keep up the vast expenditure of force ever flowing from it without the assistance of any external matter falling into it.

We would suggest also, that as the variety of life upon the earth is bound up

with the differences in the action upon its different parts of the sun's heat and light, so the continuance of this heat and light may be connected with differences in the condition of the sun's atmosphere, arising from the reaction of the earth and other planets upon it. Professor Challis has noticed the correspondence between the periodic time of Jupiter, $11\frac{1}{2}$ years, and the periodical maxima and minima of the solar spots. (Magnetism, Philos. Mag., Feb., 1861, § 37.) If the heat and light emitted from the sun are sustained by the friction due to movements in its atmosphere, of which these spots are the indication, planetary life may carry within itself the secret of its conservation. *So long as the planets continue to disturb the sun, so long may the emission of heat and light continue unimpaired.* It may begin to diminish only when the gradual absorption of the planets in the central body, through the resistance of the ethereal medium to their motion, allows the sun's atmosphere to acquire a perfect equilibrium by removing all external sources of disturbance.

Professor Tyndall makes (p. 428), from the calculations of Professor Helmholtz, a statement which, as given by him, may appear inconsistent with our hypothesis as to the nature of atoms: namely, that, if the solar system has ever been a nebulous mass of such tenuity as to occupy the orbit of the planet Neptune, "the mechanical force equivalent to the mutual gravitation of the particles of such a mass, would be 454 times the quantity of mechanical force which we now possess in our system; $\frac{1}{4}\frac{1}{2}\frac{1}{4}$ of this gravitating tendency has been already satisfied and converted into heat." But, in this statement, the *gravitating tendency* of the solar system, that is, the amount of attractive force belonging to the mass of material particles composing it, seems to us to be confused with the *mechanical force*, that is, the effect resulting from the action of this tendency under an assumed arrangement of these particles. If the gravitating tendency of the sun were now being "used up and converted into heat," the attraction of the sun upon the planets must continually diminish; a state of things inconsistent with the regularity of their movements round it. But that force which Professor Helmholtz considers to be converted into heat, is, we apprehend, not this gravitating tendency, but the motion produced by it among a certain mass of atoms, falling together from the distance of the planet Neptune to their present degree of concentration; a motion whence, no doubt, a vast amount of heat would have been generated, but which would leave the gravitating tendency or attractive force of each atom undiminished, through the restoration of force constantly going on, as explained above, from the reaction of the ethereal medium against the movements of the material atoms.

To avoid misconception we may state, once for all, that in speaking of attractive or repulsive forces we refer only to *apparent* results.

CHAPTER XIII.

Organized Being.

THE nebular hypothesis carries us back through millions of ages to the infancy of our universe, and to a conception intimately connected with the law of thought, but of which the consideration must be deferred for the present—the principle of development. Leaving that subject, therefore, we may assume, as the result of the investigation contained in the last chapter, that the elements of physical being, and the great framework of existence constituted out of them, by whatever process, do exhibit close and all-pervading analogies with this law. Their forms offer to our observation unities of opposites; that is, they display the outward or mechanical aspect of the ideal judgment. Their internal constitution has the characters of its inward or chemical aspect; that is to say, they are penetrated through and through by the thought of design, which has been shown to belong to such judgments. These two phases of thought involve all those conceptions of quality, quantity, and relations both of existence and of succession, whose logical connexion we have traced in our investigation of the conditions and development of thought, up to the conception of *polar action*. In polar action, its logical predecessors are summed up and implied; and this kind of action is apparently the constitutive principle of what we may call *cosmical existences*; that is, of those spheres, planetary or solar, on one of which we live, and to which, so far as we can judge, all higher forms of individual exist-

ence are tied. We proceed to examine the relations manifested in such *individuals*.

Our previous inquiries lead us to expect, *first*, that these beings will fall into two great classes; (1) a class where the predominant characteristic of the individual is its action upon its environment, its tendency to draw the substances around it into itself; (2) a class where the converse action predominates, and the marked characteristic of the individual is its capacity for receiving impressions, and its liability to be influenced by them. *Secondly*, these inquiries lead us to expect that in both classes the opposite aspects of the ideal judgment, the mechanical and the chemical, will combine to produce the teleological, where the principle of design will come to light, and realize itself in the production of an infinite series of forms standing in definite relations to each other.

That the world of organized being corresponds in both points to these anticipations is patent. The admirable design displayed in this living creation is the favorite topic of English writers upon the co-called evidences of the Being of God. And, although this argument is generally conducted by what is logically named a *petitio principii*,—in other words, it tacitly assumes the point to be proved, namely, that the mark of design, the adaptation of means to ends, implies a personal designer,—this objection does not apply to the position that the adaptation of means to ends is the patent characteristic of organized beings. The inquiry remains, whether we can trace in the relations of these objects that conformity to the law of thought which marks the elemental being of nature. In conducting it we propose to consider—I. The general constitution of organized creatures; II. their great subdivisions; III. the mode of their production; IV. their history.

I.—The organized beings known to us form two great groups distinguished by incapacity or capacity for free

motion ; (1) plants ; (2) animals ; and of these each specially embodies one of those opposed forms of relation, which, according to the law of thought, should exist between the individual and the world around it ; namely, (1) that where the organism is the agent and the surrounding objects are the patients drawn by it into its substance ; (2) that, where the external world is the agent, and the organism the patient acted upon by it. The plant exhibits unconscious life only. In the animal this form of life is subordinate to the production of sensation and consciousness.

Further, this process of life is carried on in all organized beings by the preservation of constant types through the continual changes of their constituent parts.¹ All organized life displays a principle of repose produced by uniting the opposite movements of absorption and emission : and the unity thus formed resolves into an opposition between the opposite groups of unconscious and conscious existences, which again is reconciled in a profounder union. In the plant change predominates *without*, and permanence *within*. In the animal the *external* is comparatively constant, the *internal* exists by continual change. The plant *consolidates* gases into fibre, the animal *burns* fibre into gases. Yet between these opposite functions the researches of modern chemistry have disclosed a beautiful oneness. The plant elaborates the primitive elements into substances fit to nourish the animal. The animal receives these substances into its body, and, by the operations there carried on, reproduces the primitive elements in a condition suitable for the nourishment of the plant. Thus the relation between unconscious and conscious organisms completely conforms to the law of thought.

Now, bodies affecting a conscious organism may be conceived to be either in immediate contact with it, or at a

¹ Flourens, *Ontologie Naturelle*, 132.

distance from it and therefore affecting it through some medium, which, according to our previous investigations, must be either the material element or the ethereal element. And in each case the organism may be thought of as affected either externally or internally. Therefore, if conscious organisms are to accord with a universe whose general characters conform to the law of thought, they should possess, as such organisms do possess upon the earth, six modes of sensation; namely,

A—The perception of bodies in immediate contact with them, and affecting them :—

1. Externally; producing the sense of ... Touch.
2. Internally; producing the sense of ... Taste.

B—The perception of bodies at a distance, affecting them through the material element :—

3. Externally; producing the sense of ... Hearing.
4. Internally; producing the sense of ... Smell.

C—The perception of bodies at a distance, affecting them through the ethereal element :—

5. Externally; producing the sense of ... Sight.
6. Internally; producing the sense of ... Heat and Cold.

It is true that the last mode of sensation is not commonly counted as a distinct sense, but is classed with the sense of touch, through which we become aware of the presence about us of bodies hotter or colder than our own bodies. But that the sensation exists is indisputable; and it seems equally clear that it ought to be distinguished from the *sense of touch*. The essential character of that sense is to inform us of the presence of some body which *impedes our activity without affecting our power*. Hence the reality especially connected with this sensation. The impediment directly calls forth our own activity, either to effect its removal or to make its continuance subordinate to our own wishes. But *heat and cold* affect our power of exertion, *not by hampering its exercise, but by modifying its energy*. Therefore the sensation produced by them is

essentially different from that of touch. On the other hand, the muscular sense, spoken of by some physiologists, is only a higher degree of the sense of resistance belonging to all touch.¹

II.—Thus we trace the principle of unity arising from opposition, under different shapes in all the great characteristics of organized beings. It is not less conspicuous in those modifications whence is derived their natural classification. In part this depends upon the adaptation of plants or animals to inhabit the opposite realms of air and land, or the intermediate region of water. But if we examine their forms carefully, we shall detect a profounder principle of opposition, dependent upon the combination of the primitive opposites of movement, expressed by the straight and the curved line. Each of the great kingdoms of organized existence, divides into three great orders, distinguished either (1) by the predominance of the rectilinear type, (2) by the predominance of the curvilinear type, or (3) by their undeveloped combination.

In the vegetable world, the linear principle characterises the Endogens and Exogens; the circular characterises the Acrogens; while in the Thallogens, stem and leaf, the representatives of the two principles, are undistinguishable.

In the animal world, the linear type prevails in the Vertebrate and Articulate classes; the circular in the Radiate; while the Mollusc combines both in undeveloped indifference.

¹ See Prof. Tyndall's remarks on the effects of heat, "a motion as strictly mechanical as the waves of the sea, or the aerial vibrations which produce sound," on our intellectual power. *Vacation Rambles*, 1861, 4. It is a favorite notion with many authors that some sorts of animals, especially insects, may have different kinds of senses from ours. We conceive this to be a confusion between *kinds* of sense and *instruments* of sensation. Insects may have far more delicate organs of sensation than we have, and may therefore perceive movements that we do not perceive; their antennæ may discharge mixed functions, as of smelling, hearing, and touch, which no one of our organs of sense discharges by itself, but such peculiarities will not give them other kinds of sense than we possess, but only other *ways of perceiving the same kinds*.

The same principle may be followed into detail. The *leaf*, where Goethe's clear insight detected the type of the plant, combines the rectilinear principle as a principle of concentration, in its stalk, with the circular expansive principle in the blade. In their mode of growth leaves are directed into two classes—the *alternate* and the *opposite*. Now, alternate leaves are arranged in a spiral: opposite leaves spring from the diameters of a circle; and, when many are grouped together, form a whorl. The line predominates in the first case; the curve in the second.

Again, the Tree is distinguished from the Shrub by the more solitary upright character of its stems, which, in the latter, have a tendency to divide into clusters; while in the Herb the circular leafy principle is the predominant feature, and the stem only shoots up temporarily.¹ So, among trees, the great natural principle of distinction consists in the mode of growth of their boughs, and this depends on different combinations of the curve and the straight line.²

In animal life the classification of forms depends upon a similar principle. The Radiate animal divides into groups of lines branching from a centre. The Vertebrate or Articulate throws out limbs from its central column. But here the principle of opposition assumes the higher character of *symmetry*: the two halves of the animal contrast each other, and give rise to that sense of equality and balanced force so deeply entwined with our feeling of the beautiful.

If we pass from the forms of organisms to their inward

¹ See note to p. 69.

² Dr. McCosh gives, in his "Typical Forms and Special Ends in Creation," the results of an interesting series of original observations on the numerical relations in the details of these forms; the sharpness or bluntness of the angles at which leaves or stems branch off; the rapidity of convolution of the spirals in which they are arranged; and the angular intervals between the buds on these spirals: illustrating the simple methods by which the unity of nature assumes its infinite variety. They are followed by similar observations on the distribution of colors in plants.

constitution, we find ourselves still on the same track. They fall into classes distinguished by the mode of combining their *hard* and *soft* parts; that is, the embodiments of those opposites of movements and repose on whose union their life depends. Is the hard part to be outside and the soft inside, or the converse? or are hard and soft to be undistinguished in their systems? On the answer to these questions hang the great divisions of living beings.

The Thallogens, for instance, form three great groups, (1) Algals, (2) Fungals, and (3) Lichenals. The Algals show no proper distinction of parts in their growth, but increase by subdivision. They are thus the representatives of the principle of indifference; and in them appears to lie the point of union between vegetable and animal life.¹ The Fungals increase by additions to their *inside*; their outside undergoing no change after its first formation.² The Lichenals grow by their medullary substance bursting through their corticle, and forming shields on their *outside*.³

Again, the Acrogens divide into, (1) the Mosses, "presenting at one point a structure nearly as simple as lichens; at another, a complexity of structure unknown elsewhere among acrogens,"⁴—thus reproducing, in a more developed aspect, the conception of a mean between opposite modes of structure: (2) the Club mosses, with a stem consisting of a solid core, or else a reticulated chord of annular vessels:⁵ (3) the Ferns, whose branch is a woody cylinder coated by a hard fibrous rind.⁶

That in the great class of seed-bearing plants, Endogens and Exogens are distinguished by the same opposition, is generally known; but less so that, alongside of them, the most scientific botanists place a class of Rhizogens, whose great characteristic, besides their parasitical habits, is their

¹ Lindley, Vegetable Kingdom, 8.

² *Ib.*, 29.

³ *Ib.* 45.

⁴ *Ib.* 54.

⁵ *Ib.* 74.

⁶ *Ib.* 69.

“fungous-like consistence.”¹ The distinction of parts by degrees of solidity is wanting in them.

A similar threefold division pervades the animal kingdom. Thus, among Radiates, we find (1) the absence of distinction between hard and soft parts, in the Jelly fish and Anemones; (2) a stony centre and jelly-like covering in the Coral-building Polypes; (3) a tough or shelly exterior with a fleshy interior in the Star-fish and Echini.

So the Molluscs offer (1) in the whole body of Shell Fish, creatures combining pulpy bodies with a solid covering, produced by, but distinct from them; an arrangement well suited to the position assigned to them by their form of representing the principle of indifference: (2) in the Tunicates, a class of creatures with a fleshy centre and tough leathery skin: and (3) in the Cephalopods, an opposite class, where a fleshy exterior covers a solid core.

Here, also, as in the vegetable world, the most important organisms belong to the linear type, which affords the greatest scope for varied development; and this subdivides into, (1) the class of Worms, where the distinction of hard and soft parts is scarcely discernible: (2) the Articulate class, where a hard exterior encloses a fleshy centre: and (3) the Vertebrate class, where the bony centre is enclosed in a fleshy exterior. With this opposition there is further blended, an opposition derived from the double principle of vegetative and sensitive existence, whose union forms animal life; the opposition of the *neural* and *hæmal* systems.² Now that the neural system should be circular in the Radiates, linear in the Articulates and Vertebrates, and should exhibit combinations of both characters in the Molluscs, may seem to result directly from the respective forms of these creatures. But the two systems manifest an independent principle of opposition. In the Radiates the

¹ Lindley, Vegetable Kingdom, 83. The classes of Dictyogens and Gymnogens, interposed between Endogens and Exogens, appear to be only links between these great classes. lb. 211, 221.

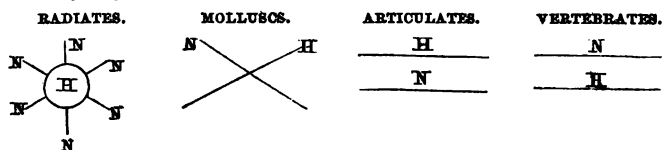
² The systems of nerves and blood vessels.

neural and hæmal systems are opposed as centre and circumference. In the Vertebrates and Articulates they are opposed as parallel lines, the neural being *below* the hæmal in the Articulates, and *above* it in the Vertebrates; while in the Molluscs the two systems cross, and the Molluscs divide into two great classes, according to the predominance given to the neural half over the hæmal, or the hæmal over the neural.¹

In the Vertebrate class, where both systems are found in their highest development, each has been shown to be specially developed on opposite sides of a central line, constituting their common base—the neural system in the head, the hæmal in the body. In the tail, at the opposite extremity of the body to the head, the two systems gradually coalesce. Between it and the body on one side, and the head and body on the other, takes place the development of the *limbs*, apparently from bones suppressed in the dorsal, cervical, and occipital arches.² And these have the opposite functions of impulsion and guidance, walking and flying, action in movement and action in repose.³

III.—Thus do plants and animals, in their general characters and in the modifications of their form, follow step by step the primary action of thought, and take from it the

¹ See Professor Huxley's Essay, Transactions of Roy. Soc. 1853. The following diagrams illustrate the opposition mentioned in the text:—



² See Owen on "The Nature of Limbs," and an article by Professor Goodrich. Edin. Nat. Philos. Journ., Feb., 1857.

³ Birds, fish, and quadrupeds exhibit two opposites and the mean in the use of limbs. In the *bird* the motive power lies in the arms, the legs in flight being useful only as a steering apparatus. In the *fish* the motive power lies in the tail, the fins being rudders. In the *quadruped* the fore legs take part in the moving force; but the chief impulse comes from the hind legs. Perhaps, however, these differences should be referred to the principle of adaptation.

great outlines of that picture, which derives the richness of its infinite variety through the processes to be next traced. We have seen that the passage from the thoughts of substance and causality to that of individuality, lies through the thought of *polarity*, that is, the conception of forces issuing from a centre, in opposite directions, to return into themselves. Now, this conception takes a double aspect. *Primarily*, the thought of polar action is opposed to that of the action and reaction of causal force. In it opposite forces are conceived to unite into a neutral substance. This is the conception of polar action embodied in *cosmical* existence. *Secondarily*, these opposites unite in the conception of a being at once substance and cause; a conception embodied in the opposite to cosmical being, namely, in *organized beings*. And this conception again resolves itself into a double opposition: (1) the phase where the thought of cause predominates; (2) the phase where the thought of substance predominates. The two kingdoms of organized life, the vegetative and the sensitive, correspond to these phases; the first to that where the thought of cause produces the thought of substance; the second, to that where the thought of substance produces the thought of cause. But both phases include and develop the thought of polarity. Accordingly, the rounded forms of all organized beings, and their twofold expansion into root and stem, tail and head, appear to indicate that the instrument employed in their formation is polar force: and Professor Challis, by his investigations into the cause of magnetism, enables us to trace the probable connexion of this mode of action with the elementary constituents of material being.

The Professor has shown that the rotation of the earth ought to give rise to currents in the ethereal atmosphere within it; and that these currents would produce, in all substances possessing a "gradated" structure, secondary currents circulating round them, and causing them to approach or diverge according to the direction of the cur-

rents.¹ Now, organized bodies appear to be "gradated" in every part. They are made up of tubes and cells filled with fluids. The action of the sides of these cells or tubes on the fluids contained in them, must produce all varieties of "gradation," and therefore continually give rise to a polar action; whence probably proceeds that diamagnetism whose discovery is one of Dr. Faraday's triumphs. It seems not unlikely, that the production within the egg of a "gradated structure," thus setting in motion those successive separations and reunions through which the principle of life manifests itself, may be the physical ground for that *division of the sexes*, on which, in the economy of nature, so much depends: the infinite richness and harmony of her living creatures on the one hand; on the other, the development of the graces and virtues of spiritual being—female loveliness, manly dignity; the affections of parent and child, brother and sister, husband and wife.²

And if we can thus trace an analogy to the action of thought in the process whence living beings arise, there can be no doubt as to the resemblance of the two actions in the subsequent stages of living existence. We have seen that to think of any ideal judgment as realized, is to think of an endless succession of forms marked by constant individual variety, connected with the persistence of certain general types. This thought naturally presents itself to us as that of an internal opposition,—a process of *growth* and

¹ Philos. Mag., January and May, 1861.

² Mr. H. Spencer infers (First Principles, 373, 374), from the fact of there being no difference microscopically discernible in the first stages of the development of germs of different kinds, that the differences of constitution appearing subsequently are due solely to the "differences of surrounding action," qualified by the "mysterious force of hereditary transmission;" of which the action is inconceivable, unless it be supposed in some way to modify the constitution of the germ. But this argument rests on the bold assumption that all forces at work in the germ must be such as we can distinguish through a microscope. Now, if the forces which differentiate the germ should be produced by atoms of the *same size as the atoms of ether*, these atoms would be invisible, because their movements would be lost in those of light; while yet they might effectually modify the action and reaction of the visible atoms constituting the germ and its environment.

decay, combining in a transitory yet ever-renewed maturity ; a process which we may observe in operation within our own minds. All knowledge is a growth, arising from the accumulation of the materials of knowledge by thought, which moulds them into unities of its own, and preserves them in vigor by perpetually introducing new matter from without ; till they change under our hands, and pass into new unities, different from their predecessors yet bearing the same general character, and like them destined to grow, come to maturity, and die out of our active consciousness. To say that life is a process of assimilation, growth, maturity, the reproduction of itself under a fresh variety, decay, and death, is therefore to say that all living beings known to us repeat in their existence the process of thought. And, since the appearance of Mr. Darwin's remarkable work on the "Origin of Species," the tendency of scientific thinkers has been to recognize in the history of life upon the earth the repetition of the same process upon a larger scale.

IV.—Thus we arrive at our last head of inquiry—the analogy between the law of thought and the history of life. Now, if Mr. Darwin's theory is to be accepted according to his exposition of it, this analogy would fail. For thought is realized through the formation of ideal judgments ; and in every such judgment there must be a principle of permanence, manifested beneath every variety of change. In its realizations we should always discern the one in the many : the general thought preserved amidst all the endless particularities of the individual.

This is actually the case in nature. We might compare millions of leaves of the same kind, and not find any two exactly alike in every respect. Yet under all their differences there would be discernible a principle of unity ; one in the midst of all the infinity of its modifications. But, if we are to believe Mr. Darwin, this apparent principle of permanence is due only to the action of circumstances, in

of the infinite variety displayed by living beings. But *how* is this ever-present disposition to vary to be summed up in one direction rather than in another? Mr. Darwin can think of no other process than a clumsy imitation of that through which man produces varieties. Man keeps the creatures, which show a tendency to vary in any required direction, apart from all others so that they may interbreed only with each other. How is nature to keep her varieties from intermixing? By killing off all except the required one, through the "struggle for existence," replies Mr. Darwin. But nature exhibits to us forces at work far more effectual for this purpose, in the instincts of sex and the conditions of fertility. Why should we not ascribe the formation of species to the operation of those powers by which we know them to be preserved? The ascertained result is produced by the reconciliation of two opposite actions: namely, (1) a tendency to change, due to the differences in the constitution of the parents; (2) a tendency to permanence, due to the similarities of the parents disposed to unite. Hence arises the hereditary transmission of peculiarities, ever varying, and yet always confined within certain bounds. Is it unreasonable to suppose that, when a new species is produced, *both* tendencies are modified simultaneously; so that the disposition to vary in any particular direction may be accompanied in the creatures showing it, (1) by a preference for each other's society, where such a preference is possible; (2) by a greater fertility attending their union than that attending a union with creatures not disposed to vary similarly? Then the principle of hereditary transmission would develop both tendencies: and the cases adduced by Mr. Darwin show how small a number of generations might suffice to form a new species strikingly different from the former. To suppose that the transition from one species to another can be effected by the action of *one* only of the *two* powers required for their preservation, is like supposing that a

wall could be originally built of bricks only without mortar, though to keep it in repair both bricks and mortar are necessary.¹

The proof that the diversity of species has arisen by the evolution of one species out of another, through the "adding up" of differences, lies in the facts, (1) that this conception explains the relation of past and present forms with a clearness such as no other conception about that relation offers; (2) that the power of variation is known to exist. But the result to be explained involves the production of certain changes in the constitution and desires of the living beings constituting the new species. Now, precisely on this central point, Mr. Darwin's theory breaks down. He offers no explanation of the way in which these internal changes have been brought about. In truth, his theory suffers from the dread commonly entertained by scientific men of admitting an intelligence present in nature. They do not deny an Intelligent Creative Will, if only it can be put a long way off. Their ideal God would be one who constructed the laws of Nature millions of years ago, and then died, leaving Nature surviving. The reaction against the common theological notion, of a God who works without means, has driven them to the conception of a universe of means without ends, generated by a *Deus ex machina*, who sets the ball spinning and then leaves it. But—

¹ It is quite consistent with this hypothesis that *peculiarities* of form in any particular species should have been determined by the "struggle for existence," as Mr. Darwin supposes. The great length of the tubes leading to the nectaries in certain orchids, for instance, may have been occasioned by the efforts of large moths to get at the nectar; while the superior nourishment thus derived kept up in turn the race of large moths. (See "Fertilization of Orchids.") The infinite variety of nature within the limits of each species, is apparently due to the *action* of circumstances upon the creatures thus varying; and this external action may have led to the particular *kinds of form* fixed in these species. We contend only, that this *action* is accompanied by a *reaction* of the constitution of the creature against it, depending on the existence of *kinds of form*, determined by the ideal type of that constitution. Thus, the *design* spoken of so often by Mr. Darwin (see Edinburgh Review, No. 236, p. 392-394), becomes a reality to thought because it is an effect of thought, without degenerating into caprice.

An Drähten die von Himmel längen,
Lässt sich kein Welt des Lebens hängen.¹

In the law of thought, means and ends, the particular and the general, combine to produce the individual. And to this action the production of species bears witness. To account for their origin, the principle of permanence is needed, no less than the principle of variation. Now, we have identified this principle of permanence with the formation of ideal judgments; that is, with the direct operation of intelligent thought. Therefore we conclude that the "selection" whence species arise is adapted to the "struggle for existence" not produced by it.²

Thus we escape one serious difficulty continually urged in the controversies occasioned by Mr. Darwin's work, namely, the absence in geological remains of those intermediate forms which ought to be found if species were produced only through such a multiplication of particular varieties as would suffice to squeeze out their competitors. For, if the "selection" involves an intelligent internal agency, this would come into exercise only when circumstances called for it; and would be continued in the required

¹ The world of life cannot be hung
To wires from the heavens strung.

² This position is more fully considered in a paper by the present author on "Typical Selection," read before the Zoological Society in Feb., 1861, and published in their proceedings. Mr. Darwin does not attempt to show how the preservation of any particular advantage by any one or more families of beings "struggling for existence" is conceivable, if they have not a special disposition to interbreed. How is it to be prevented from merging into the general characteristics of the family?

Professor Owen, in his account of the Aye-aye (Zool. Trans., 1863, 91-97), admits the probability that the creation of new species proceeds by "derivation" of one species from a former one; while he forcibly contends that the hypothesis of selection by the "struggle for existence" does not suffice to account for it; and maintains that "the derivative hypothesis is, at present, little more than an indication of a route of research by which the mode and way of derivation may be ultimately better understood." The road to this "better understanding" we apprehend to lie in *giving reality* to that principle of *adaptation* on which Professor Owen ably insists (p. 89), by showing that there is in organic beings a *something to be adapted*—a framework supplied by the law of thought, to which the delicate finish of teleology can be applied, and *through* which its application is made possible.

direction only till the desired effect was produced. So that there might never have existed more than a few hundreds, perhaps a few score, of creatures exhibiting peculiarities intermediate between any old species and a new one derived from it; and, in many instances, these peculiarities might not be of a kind to attract our attention, even if we happened to find the remains of the animals displaying them. The skeletons of the dog and the fox, for instance, are undistinguishable: the characteristic difference lies in the form of the pupil. Yet the habits of the one are diurnal; of the other nocturnal. If a new species were developed both from dog and from fox, under conditions tending to a change of the bony parts, the difference of habits might lead to modifications of form widely different, though both were derived from skeletons possessing the same characteristics.

Nor is this the only advantage gained in reference to Mr. Darwin's theory, by assigning the production of species to an action governed by the law of thought. The same law will furnish us also with a clue to the principle by which the succession of species has been regulated; at least, if we follow the guidance of that genial and profound student of nature, the justly lamented Edward Forbes. For, according to him, animal remains exhibit two periods of *opposite developments*, separated by a period of transition, in the following order:—

Azoic	Marked by the absence of organized being.
Palæozoic	<div> <div> Silurian and Devonian: epoch of maximum production of generic types. </div> <div> Oolitic: intermediate. </div> </div>
	Permian and Triassic: epoch of minimum production of generic types.
Neozoic	<div> <div>Carboniferous: intermediate.</div> <div>Cretaceous and Tertiary: epoch of maximum production of generic types.</div> </div>
Present	Marked by the presence of intelligent being.

And in these periods, Professor Forbes distinguishes the following contrasted groups :—

PALÆOZOIC PERIOD.	GROUPS.	NEOZOIC PERIOD.
Ganoid and Placoid	Fish	Cycloid and Stenoid.
Entomostratous	Crustacea	Malacostratus.
Tetrabranchiate	Cephalopoda ...	Dibranchiate.
Palliobranchiate	Acephala	Lamellibranchiate.
Crinoidea	Sea Urchins ...	Echinoidea.
Four-starred	Corals	Six-starred. ¹

¹ See M'Cosh, *Typical Forms*, 334. That a great confusion in the conception of species should arise, among naturalists who have been occupied in the attempt to classify individuals of whom we know nothing but the differences existing in their bony or shelly remains, is easily intelligible; and the more likely, if they set out with an inadequate notion of the degree of variableness of which the bony or shelly parts of the same species admit. When we deal with the remains of animals of whom no living specimens exist, we can only *infer* the existence of natural species among them, from the fact that, in the present living creatures, marked diversities of form are generally associated with marked differences in the sexual tendencies. We cannot clench our conclusions by observing which of these animals had a peculiar disposition to interbreed, and fertility in interbreeding; and are therefore peculiarly liable to be perplexed in marking the limits of our species. But to raise from this perplexity an argument against the existence of species, by overlooking the clear ground of distinction afforded by the sexual instincts of the living races, is to reverse all sound reasoning, by arguing from the unknown to the known, instead of from the known to the unknown.

CHAPTER XIV.

Intelligent Being.

IN the two last chapters we have followed step by step the accordance between the law of thought and the phenomena of nature, through the series of outward relations seen, (1) in the general constitution of the universe; (2) in the character of its constituent elements; (3) in the combinations of these elements whence arise living beings, under the opposite characters of vegetable and animal organisms. We come now to the more difficult problems connected with those beings in whom the long series of oppositions hitherto followed by us is summed up; in whom a complete individuality is produced, by the union of these opposite characters, to form the self-conscious activity of a sensitive will.

For here we meet with that ancient perplexity, the origin and the nature of evil; the ground of that "struggle for existence," which plays so important a part in the actual world, and yet seems so inconsistent with the wisdom and goodness demanded by our religious instincts in the Creator. Let us see whether the law of thought will help us here. According to the definition of the nature of thought to which the study of this law led us, it is a will whose essential character is, to pass out of itself in order to realize its own energies; transfusing itself into its object, and identifying itself with its work. Now, what is this definition but a metaphysical description of *love*? The law of thought, then, is one with the manifestation of

unselfish action. Yet this action must present an *appearance* very different from its *essence*. For, according to the same definition, the action of thought is to produce the opposite or "other" of itself. Now, if the *essence of thought* be a principle of *love*, its *opposite* must be a principle of *selfishness*.

This position may appear at first sight to be a mere paradox. But the more it is examined the more clearly will its truth be seen. Love pours itself out in the infinity of *ends*,—the desire to produce boundless happiness. Selfishness is always intent on the *means* for its single end of self-gratification. But love cannot attain its ends without means. It must produce beings in whom the principle of self is realized,—who have an existence of their own, in order to bless them. Then it assumes the noble aspect of the spirit of harmony, which seeks the welfare of each being according to its special constitution, and so produces the welfare of all. On the other hand, the principle of selfishness implies the action of love. It is a reflection, impossible without a previous expansion. There could be no selfishness if there were no love, for the "self" would disappear. To say that the creature is primarily selfish, is therefore only to say that it is produced according to the law of thought; that it is the form of being which love sets over against itself as its object. The foundation of all created being is *self*; that is to say, the principle of individuality; that through which the me is a *me*, and is distinguished from every *not-me*.¹ From this foundation love evolves the magnificent harmonies of the universe.

In the elemental atom the selfish principle is at its

¹ The perception of this relation has led Mr. Bain, in his "Study of Character," to treat "disinterestedness" as an "anomaly" in man's constitution; a "paradox" and a "puzzle;" a species of "irrationality" and "insanity;" a "contradiction of the most essential nature of a sentient being, which is to move to pleasure and from pain;" though he allows it to be a "fact in our constitution; and that without it there could be no great virtue in the world." A writer in the "Saturday Review" for Jan. 4, 1862, justly observes, that "a theory can hardly be called philosophically tolerable" which is driven to such

maximum. Each atom exists by asserting its individual nature against all others, with which it is brought into accordance only through the adjustment of conflicting forces, produced by a wisdom external to itself. In unconscious organized beings, the traces of this adjusting wisdom appear within each organism. Its parts are what they are, for the sake of the whole. But that whole continues to assert its individual being against all other beings, with an entire disregard of any other quality in them but their strength. Its life, as Mr. Darwin has admirably shown, is a perpetual "struggle for existence" with those of its own kind even more than with creatures of a different kind. Nor does this "struggle," cease, when, to this lowest form of organization is added its opposite, namely, conscious being: on the contrary, it assumes that aspect of creatures formed to prey upon each other, which men have found so difficult to reconcile with a belief in the wisdom and goodness of God.

Now, this difficulty derives its force principally from the habit of conceiving the Divine Omnipotence to be, not a limitless power to produce reasonable worlds, but the power to produce whatever man's unbounded imagination may crave; light *without* darkness; pleasure *without* pain; life *without* death, etc. etc. It disappears if the actual world be assumed to realize the law of thought. For, according to this law, the transition from the individuality of the plant to that of human intelligence ought to be

contradictions; but gives no intimation of any way of reconciling them, nor hint of their origin.

The perception of this radical difference between the creature and the Creator is asserted theologically, in the doctrine of the "fall of man," and the "original sinfulness" of his nature consequent upon it; a conception, full of the profoundest truth, namely, that man is naturally "alienated" from God, but transformed by theologians into the fatal superstition that, therefore, God is "alienated" from him. The whole question is turned upside down when presented, as it commonly is, under the form *πῶθεν τὸ κακόν*; the real marvel is *πῶθεν τὸ ἀγαθόν*; and its true explanation is, that evil is a name given to the principle of *individuality* through which existence is primarily manifested, by those beings in whom is awakened the consciousness of a deeper principle of *universality*, on which this primary manifestation depends.

made by a class of individuals whose wills are governed by their sensations. And animals are such a class of beings ; less selfish than the plant, as the plant is less selfish than the elemental atom ; for in them the breath of love begins to make itself felt, in the affection of male and female for each other and of the parents for their young, and in the instincts of social aggregation ; but not capable of that self-control without which the higher manifestations of love are impossible. On this assumption we may reasonably say, with Paley and Buckland, that the sum of happiness is increased by the subsistence among such creatures of the relations of eater and eaten, without being troubled by the question why such relations exist at all : and may feel with the author of the 104th Psalm, that God is to be sincerely praised for his goodness in "feeding the young lions who call upon him ;" quietly dismissing the pious fancy that creation could be mended by reducing every impulse to a dead level of emptiness. The study of the law of thought enables us to reconcile the manifestation of individual energy with the faith that the universe is not a *mere* struggle of mights. The seat of life on the earth is the sphere of the freest movement ; and the individuals forming the two first stages of organized being exhibit a rising scale of active powers. Thus the free activity of the individual is stamped upon creation as one of its great ends. But with the third stage of the ascending series, there appears beneath the principle of individual impulse the opposite principle of a regard for the general good : beneath the movement of self-assertion appears the repose of self-government ; the faculty of the selfish will to attune itself to love. To enter into the nature of this process we must trace the development of conscious intelligence in the animal world.

Animal instincts follow the law of thought. They employ natural objects as means to their own ends by uniting what in nature is distinguished. The bird collects

materials of opposite qualities—hard and soft, flexible and stiff—to build its nest, according to an idea formed by its intellect. But, in animals, the power of forming ideal judgments is restricted within narrow limits. Herein lies their strength—and their weakness. Within its prescribed limits, and under its prescribed conditions, the operations of instinct are certain. But if removed from its natural sphere, it will produce results utterly nonsensical; as has been noticed above in regard to the beaver. The critical faculty of the animal intellect is generally restricted to the exercise of a few conceptions in given cases, and does not extend to determine whether these conceptions apply to new circumstances. The animals whose faculties approach most nearly to those of man begin to manifest the power of judging between many different conceptions, and therefore are able to learn. The shepherd's dog, for instance, knows the haunts of its owner's flock among the hills, or in the "bush;" and will hunt for them in the place where they are likely to be found. It does no one thing so wonderful as the beaver, but it has far more general sagacity.

But, although the animal intellect, in its higher manifestations, displays a considerable capacity for choosing the means suitable to its ends, it shows no capacity of choice in regard to its ends. In its natural state, the animal is carried in this or in that direction by the spontaneous impulses of its being, and does not attempt to modify them. Under the loving guidance of man, something like self-government begins to be visible. For instance, Mr. Rarey's system of taming horses, etc., resolves itself into producing in the animal to be tamed, a consciousness of the presence of a superior being, mysteriously strong, but withal beneficent. The production of this consciousness requires a considerable power of thought in the animal. But, when produced, it appears to call forth a spirit of confiding trustfulness and readiness to be guided, by

which the animal intellect enters into a sphere above its own.¹ The growth is artificial, but the possibility of producing it shows the accordance between the intellect of the animal, so far as it extends, and that of man. We see that it is the manifestation of a power acting according to the law of thought.

Now, experiments seem to prove conclusively that animal intelligence resides in the nervous centres. Hence the force of the argument, that to think is a function of the brain; just as to assimilate food is a function of the stomach, and to oxygenate the blood is a function of the lungs. In fact, at the present day, an impartial inquirer must admit the impossibility of distinguishing either our intellectual or our emotional nature from the action of the brain. But it does not follow that, because the organ of thought and emotion is composed of substances perceptible to sense, therefore thought and emotion are *only* peculiar movements of sensible substances. On the contrary, the legitimate inference is, that if thought and emotion are manifested by substances perceptible to sense, the phenomena of sense must be special limitations of a power whose essential nature is to think and to love. The less may be derived from the greater; but it is contrary to reason to deduce the greater from the less. In human nature this essence begins to manifest itself.²

¹ See an interesting article on this subject in Macmillan's Magazine for November, 1860.

² How the power of thought results from organization, we do not undertake to explain; yet our fundamental hypothesis seems to offer some clue to this profound mystery. If all existence arises from combinations of movements determined by a conscious will, each of these centres of motion must be supposed to possess a consciousness of its own movements. Now, this consciousness would involve a knowledge,—in regard to its own constitution, of, (1) the differences of these movements; (2) their unity;—and in regard to other centres, of, (1) their distinction from itself; (2) the relation of their movements to its own, in impeding or concurring with them. Then, if groups of atoms each possessing this amount of consciousness, were so combined that their movements agreed, there would naturally arise among them a *consciousness* of this accordance, and a *will* to maintain it by perpetually bringing all disturbing movements into unity with their common constitution; that is to

Man possesses organs of thought and emotion, analogous in kind to those of animals, though greatly surpassing them in degree; and he possesses something besides, namely, a *regulative will*; which stands in communication with all these organs, and appears to have the function of keeping them in harmony with each other, and therefore in the state best fitted for fulfilling their special offices. It may be impossible for men to determine whence this will arises, but that it exists seems to us certain. Clearly every faculty of thought or emotion requires control; none limits itself; each one taken by itself is prone to exceed its due bounds. What fixes these bounds? Not merely the power

say, there would arise precisely that kind of constructive action which we consciously exercise.

That we should be conscious of this constructive faculty as unlimited must follow, if, as the general analogy of all organized bodies indicates, each of these groups of atoms is susceptible of infinitely varied modifications without losing its distinctive principle of unity. *Perceiving* our minds to be capable of exercising an unlimited number of constructive acts, we apply the *conception* of unlimited number to the thoughts of space and time which each constructive act involves.

That these combinations of thinking power would also be centres of emotion, is involved in the conception that each centre of thought is an expression of will, under its double aspect of, (1) the assertion of itself against the action of other wills; (2) the preservation of an harmonious relation between its own action and that of its environment. For every emotion lies between these extremes.

The relation between *sensation* and *thought* is readily explained by this hypothesis, if, as all science tends to show, sensation always implies the production of movements in our nervous organization. For if thought consists in the conscious combination of such movements, sensation must necessarily produce thought.

The identification of thought and emotion with the movements of the brain, suggested here, must not be misinterpreted into an attempt to *explain away* the spiritual character of our emotions. To learn what the character of our emotions is, we must appeal to our consciousness, as to learn what the effect of light upon us is, we must appeal to our eyes. The scientific explanation of the effects perceived is one thing, the effects themselves are another. We could not divine the glories of the sunset from the theory of luminiferous undulations; though by it we can account for them. Nor could we divine the character of love from a theory of the movements of the brain, even were it so perfect that we could trace step by step the physical origin of each phase of each emotion experienced. The *spiritual* can be studied only from *within*. It is the function of physical science to point out the connexion of this internal with its external manifestation. But to point out this connexion does not involve the assertion that the depths of conscious will can be fathomed by a mathematical sounding line.

of other desires. We are conscious of something in us which judges between our desires. And to this something we can give no name so appropriate as that of the Regulative Will. Now, the structure of the brain, according to the latest physiological researches, is admirably adapted for the exercise of such a power. It appears to consist of bunches of separate conducting fibres communicating with innumerable cells; which seem to be centralizing organs, intended to give unity to the movements arriving through these fibres from different directions; for several fibres meet in each cell, and the cells are united by other fibres into larger groups; so that the brain has been compared to a network of telegraphs with millions of communicating stations. And yet there is no single centre, to which all impressions can converge and whence all impulses may start.¹ The whole brain is an instrument exquisitely adapted to the operations of a power which distinguishes in order to combine, and combines in order to distinguish. But, to preserve a unity of action between all its parts, some power seems to be needed which communicates with them all. This power we conceive to be the regulative will, or soul. It has no *special* residence within the brain, because it is its function to communicate with all the organs of thought or emotion, and maintain its own freedom by maintaining the balance between them.²

The language of common experience, by treating a healthy mind as one well balanced, agrees with the solution here given of that perplexed question *the liberty of the will*. It accords also with the doctrines of *phrenology*, which, however questionable in their details, are supported in their great outlines both by the obvious connexion be-

¹ See an account of Rudolph Wagner's researches on the structure of the brain, in note to "Contributions to Mental Philosophy," by F. H. Fichte: translated by Mr. Morrell.

² The regulative will thus performs for the conscious operations of the nervous power an office analogous to that performed for its unconscious operations by the cerebellum. It co-ordinates their special actions. See Flourens, *De la Vie et de l'Intelligence*, ch. vii.

tween the shape of the head and the intellectual and moral faculties of man, and by the fact that distinction of functions is the normal law of nervous action.¹ At the same time this theory supplies the great defect of phrenology as a philosophical system, namely, that it has no "me," but offers a multitude of impulsive and instrumental faculties, with nothing to use the instruments, or be urged to action by the impulse. Now we have a consciousness of such a "me," of some governing principle which is not our intellect nor our desires, but employs the one and is affected by the other, as our intellects and desires use our hands and are affected by the reports of our senses. In this "me" lies the essential distinction between man and animals. The animal stops short of complete individuality: its will is governed by its senses. To fill up the conception of individuality, the action from without must call forth a reaction from within. In man this step is taken. The seat of government is transferred from the organs of sense to a faculty whose business it is to give unity to the special activities of the different mental organs, and thus to produce a harmony of thoughts and desires in the action of the brain; *i.e.*, in what we call the mind. And this harmony is produced by thought. The regulative will co-ordinates the special thoughts and emotions, arising from the peculiar actions of the several parts of the brain, under conceptions capable of giving them unity. It criticises its own conceptions, as every faculty of thought criticises the conceptions formed by it in its own sphere; and is sovereign over all our mental faculties, not because its nature is different from theirs, but because it deals with the *results* of their operations. Each separate faculty of thought or emotion judges between the conceptions belong-

¹ The phrenological arrangement of organs follows the law of opposition. The intellectual faculties in the front of the head are opposed to the emotional at the back; and the faculties which specially regard other persons are opposed, in the crown, to the self-preservative animal faculties at the base.

ing to its own sphere of action. The regulative will judges between the faculties themselves.¹

Thus the universe offers to us a cycle of being answering to the law of thought. It rests upon unities of moving force, constructed by the primitive faculty of will by means of the freely determined limitations of thought; whence arises the harmony of those endless diversities manifested in the organic world. Again the free constructive power of thinking will intervenes, to produce from these primitive unities the more varied richness of organized life; and ascends through the unconscious mediatorial kingdom of plants to the world of animals, where thought appears in the shape of instincts, combined with a fulness continually increasing till it culminates in man. Now that in the instinct of the animal thought is limited, all will admit. In man, it may be said, no limits can be set to thought, whatever be its subject. Yet, if the *range* of thought is unlimited, its *subject matters* are not. Genius is confessedly prone to be exclusive, engrossed by its special tendencies; and the same specialty appears in all minds, though less strongly marked, and constitutes the diversities of disposition. The human mind, notwithstanding the boundless range of thought open to each of its faculties, preserves its

¹ It follows that in every special faculty there is a double will; (1) the will belonging to the organization of the special faculty, which may be set in motion either through the senses, or through the operation of the regulative will upon it, and when set in motion acts according to its own constitution, subject to the modifications produced by the combination of this action with that of other special faculties effected by means of the regulative will; (2) the regulative will, which, though induced to act through the movements of the powers regulated by it, is essentially spontaneous and creative, dealing with ends rather than means; determining by the aid of all the special faculties of knowledge what ought to be done; and calling forth and directing all the energies of the system, mental and bodily, in order to do it. Therefore *mad* men are well called men "beside themselves;" and in former times were supposed to be possessed by evil spirits. The governing will is dethroned, but not destroyed; and at every favorable opportunity tries to assert its authority over its vassals, who have lost the constitution fitting them for obedience, and run wild in their own spheres in the exercise of their natural energies. The earnestness and reality, and at the same time the eccentricity, often displayed by persons in whom strong *religious emotions* are suddenly awakened, are well explained by this theory.

affinity to instinct. Each of these faculties deals with means for attaining ends prescribed by its natural bent. But in man these *limited* powers of thought come into contact with the fundamental principle of thought, the *limiting* power of will, whose function is the choice of ends. And this principle manifests itself as a power of sympathy; a will which, entering into every special impulse, can educe unity out of their differences, and thus constitute a moral being, as the crown of intellectual activity and the condition of its perfection. Does not experience testify that in this same power, when it overflows into action in the world around it, lies a magic whose influence the loftiest intellect owns, and that without it the highest genius is ineffective for practical good? ¹

¹ "I find this more and more every day; an *infinite of tenderness* is the chief gift and inheritance of all truly great men—involving a relative intensity of disdain towards base things." (Ruskin, *The Two Paths*, 37.) This tenderness we apprehend to constitute that "faculty of entering into the common life of men, of escaping from the limits of our narrow selfish horizon," which Mr. Maurice understands by genius. (*Moral and Metaph. Philos.* iv. 331). But the faculty is moral rather than intellectual; though the intellectual power shows its affinity to the moral, by manifesting the same kind of universal sympathy in its highest form—that of a great poetic mind. Mr. Carlyle's tendency to claim goodness as an attribute of genius, arises apparently from a somewhat indistinct perception of the relations between the moral will as the governing principle in our nature, and the powers governed by it.

CHAPTER XV.

The Divine Being.

THE study of the power displayed in nature has led us to place its highest manifestation in a sympathizing, that is, a loving will. But this sympathy must not be confused with what is commonly called sentimentality. It is the sympathy of a governing power, which claims obedience from its subjects, and enters into their desires in order to assign to each its proper function, and keep each in due subordination to the whole. To borrow a simile from Mr. Carlyle, if it is tender as the moss, it is firm as the granite beneath: a faculty essentially sovereign; tolerating no compromise with evil, however accurately it may estimate the strength of temptation, however ready it may be to pardon the repentant.

That this sympathizing will is displayed by men in very various degrees of perfection, is so far from a grave objection to its forming the distinctive character of humanity, that it is just such a phenomenon as we must expect, if the universe and man are formed by a power acting according to the law of thought. The diversity proves only, that the great characteristic of this law, the production of variety in unity, applies to spiritual being as well as to physical. On the other hand, that the presence of such a governing will is the true principle of humanity, is shown by the history of mankind in the constitution, (1) of systems of law; (2) of systems of religion.

1. The *laws* of all ancient nations claim a divine origin.

They are ascribed either directly to the voice of God, or to the teachings of men to whom the Deity was supposed to have directly communicated them. The original form of all governments appears to have been theocratical.¹ In no case can we trace back systems of law to that voluntary compact arising from a sense of utility, from the desire to escape out of a primitive state of war on account of the greater advantages of peace, to which those writers who have not appreciated the importance of the religious element in human nature would attribute them. How, indeed, could men be induced to exchange their natural liberty for the restraints of society, by the prospective calculation of advantages to be known only through their experience of society. That laws should have grown up out of calculations of advantage, is therefore as improbable as it is historically certain that they did arise from the belief in their containing the teachings of Divine Beings. In other words, law expresses the instinctive recognition by man of a power higher than natural power, in that governing voice within him which claims to regulate the impulses of nature.

2. That these theocratic systems should be modified, in the progress of society, by the separation of the regulations concerning the Divine worship from the laws relating to the conduct of men to each other, was an indispensable condition of any permanent progress. It is the nature of all theocracies to stereotype thought. What is enjoined by a Divine authority cannot be called in question. And since laws so sanctioned become the substitutes for conscience, the lawgiver logically assumes the regulation of the whole course of life; and oppresses the freedom of thought and action by a host of minute observances.² To distinguish the acts to be done or omitted out of reverence

¹ See Flotard, *Etudes sur la Theocratie*, Paris, 1861. Mich. Nicholas, *Essais de Philosophie et d'Histoire Religieuse*, Paris, 1863.

² See instances in M. Nicholas, *Essais*, pp. 38, 39.

to God from the acts to be done or omitted out of regard to man, is therefore a necessary preliminary to the growth of that spiritual consciousness, to which law becomes, not a system of rules imposed on men by an authority foreign to their nature, but the expression of that nature in its profoundest constitution—the voice of a regulative will heard within them.

Now with the separation of worship from morals there inevitably grows up a disposition to deny any real existence to the ancient Object of worship. When it is admitted that this worship is utterly valueless except it be connected with a life of moral nobleness and self-control, men ask whether such a life may not rest upon itself; whether it may not dispense altogether with the reference to a Being whose moral action is undistinguishable from the inner will by which their life is regulated. But the disposition to raise this question springs from the appreciation of moral will as a rule of conduct, rather than as a principle of sympathy. Will, conceived merely as a governing power, can rest upon itself; or, if it seek support, is satisfied to look for it in the harmony discernible by thought between its own dictates and the teachings of experience. But the will in its deepest source, the principle of tenderness, naturally reposes on the faith that beneath the hard crust of the universe there is a will responsive to itself. It affirms itself to be the image of a Divine will, a self-existing, conscious, governing, and yet sympathizing reason, with which the human will may enter into communion, and from whose strength it may derive strength. On this belief *religion* is grounded as a spiritual principle; and in support of it, three lines of argument have been adduced, which, though already partly considered, we will sum up here for greater clearness, with the objections made to them. It has been alleged, then:—

1st. That man has an innate idea of an all-perfect Being, the source of all existence;

2nd. That nature is full of marks of design ; and that this design implies a Designer, whose wisdom and goodness may be gathered from his works ;

3rd. That man aspires after perfect beauty, harmony, truth, justice, goodness ; and that this aspiration implies a Being of perfect moral beauty, harmony, wisdom, justice, and goodness, from whom it proceeds and to whom it is directed ; and who must be distinct from nature, because nature is imperfect.

Against each of these arguments, however, very grave objections may be adduced.

1st. It is urged, that if men had an innate idea of an all-perfect Source of all, they could not have formed such very different conceptions of the character and nature of this Divine Being, as they notoriously have done.

2nd. The conception of conscious design is alleged to apply only to cases where an intelligent being deals with materials which he does not produce, and to be wholly inapplicable to one from whose will both means and ends arise.¹

3rd. Admitting that there would be great force in the argument from our mental tendencies to the nature of the source whence those tendencies arise, if the argument were equally applied to every such tendency, it is objected that we are conscious in ourselves of many desires unjust, unloving, untruthful, inharmonious. Are we to ascribe these feelings also to God? Our reason revolts from the conclusion. Yet it lies within the scope of our argument. And to escape from the cogency of our own logic we turn for the proof of the Divine perfections to that very nature, whose incompetence to supply conceptions of its author satisfactory to our minds, is the foundation of the

¹ In fact, this is the modern form of that argument from the "Practical Reason" substituted by Kant, in place of the old demonstration of the personality of God, drawn from the impossibility of conceiving the universe to arise otherwise than by the action of a conscious Will. See Chapter i., where this objection is more fully stated.

argument for the existence of a supernatural power, from whom our own being is derived.

Thus the reasoning of Natural Theology, so strong in its first aspect,—when we ask, “he that planted the ear shall not he hear? he that formed the eye shall not he see?”—loses itself in difficulties, when we look closely into it. But from these difficulties the law of thought opens a way of escape.

1. If the universe is the expression of a power acting according to this law, it must, as we have seen, present the appearance of a struggle of *mights*. The deep principle of *love* underlying this manifestation of strength, would display itself only as a principle of harmony evolving order out of the struggle, but not suppressing it. Thus the argument, from the aspirations of man after a Being of perfect goodness, to the existence of such a Being, remains unaffected by the presence in man of impulses inconsistent, in their own unregulated character, with this perfection. These impulses become to thought, only manifestations of that principle of strength, the “other” of love, which Love uses as the indispensable means to her own ends. It is accordant with reason that such phenomena should exist, and their existence, therefore, ceases to be any hindrance to the faith that the universe does arise from the action of that conscious, governing, tender Will, on which religion anchors her hope.

2. Thus the objections to the affirmations of faith are reduced to the proposition, that the exercise of a conscious will is inconceivable except in respect to beings limited by other beings forming the objects of their mental action,—that of which their consciousness is conscious. But the strength of this objection vanishes, when we consider that our own consciousness acts by constructing the objects of which we are conscious. Our own reason is what we must conceive the self-existing Reason to be, at once effect and cause. Its knowledge is the effect of its own action; and

this action is determined by the production of the effects to be known. We have seen that it is the essential character of thought to set itself over against itself, as the "other" of itself, which yet is itself. All our thoughts have this character. They are a something set over against our thinking being by its own action ; different from itself and yet one with itself. We take the materials supplied by our senses, for instance, and give unity to them by our power of conception. These unities then become to us realities distinct from ourselves, though so completely created by our thought, that the world of science is in all its great features the converse of the world of sense ; a world which we "see with our eyes shut." The same character appears in the thoughts furthest removed from the influence of the senses. The practical determinations of the man of action ; the vivid imaginings of the musician, the artist, the poet ; the closely defined conceptions of the mathematician, or philosopher,—all and each stand over against their author ; distinct from his power of thought, and yet giving to that power its reality ; arising from his will, and yet independent of that will ; freely springing out of the depths of his being, and yet "other" than that being. Our personality consists in the consciousness of this distinction. Now this consciousness is as conceivable of a self-existing Being, as of one whose existence, like our own, is derived. For we have seen that our thought goes back to the first stage of existence. It commences with the thoughts of space and time, which it proceeds to people with ideal judgments ; that is, with the conception of movements mutually limiting each other. And these movements have the same quality of becoming objects of consciousness, as have the thoughts resting upon them. So that we must conclude consciousness to belong to thought as thought. In other words *thought is conscious of itself*. Consciousness does not imply any object distinct from the thinking power of which it may be conscious ; but this latter sort.

of consciousness belongs, not to thought as thought, but to thought as exercised by a finite being, endowed with the power of communicating with other beings finite like itself.

Therefore we are justified by reason in attributing to God a *consciousness* distinct from our consciousness, and *involved in his action in creation*. Our own consciousness bears out the assumptions of our religious feeling, that "he who makes the ear" does hear; "he who forms the eye" does see; in other words, that the Creative power is conscious of its work. For the difference between this creative action and the action of our thought is reduced to the circumstance, that we cannot give to our creations that power of observing and acting upon each other, which the creative thought of God bestows upon ourselves, and the objects round us. To convert our thoughts into objects of sense, we must borrow from the stores of our Maker.¹ But this difference does not affect the question of consciousness. On the contrary, if the ideal judgments, with which we can people the space created by our imaginations, remain to our consciousness distinct from ourselves though they are discernible only by ourselves, much more would they be thus distinct, if we could make them act on each other.

Now, the world of sense, if it arises from such an action as is here supposed, would unite absolute *freedom* with absolute *necessity*; for it would rest upon the determination and combination of lines of motion acting in different directions. And we perceive by our own consciousness that this operation of thought is entirely free. We can conceive lines of motion taking any direction, and limited in any way we choose. Seriously to deny the freedom of thought in this respect would be a good title to Bedlam. But we have seen also that from the conception of motions thus limited, we may deduce a universe in complete ac-

¹ Whence is derived Malebranche's position, that we do nothing but by God. See Maurice M. and M. P., iv. 363.

cordance with the universe of observation. Gravitation, molecular action, chemical action, crystallization, light, heat, electricity, magnetism, all these natural forces by which we are environed, may be explained by supposing the existence of such movements. The world of science would "spring up at God's command" under their actions and reactions. From the exercise of a power essentially free would arise infinitely varied manifestations characterized by an external necessity. Thus we rescue the thoughts of *personality* and *freedom* for our religious faith, without giving up the possibility of *science*. We see that the creature is neither the result of an action from which free will and thought are excluded, nor yet a play of the creative principle with itself; but that it arises from the thought of God, as mathematical conceptions arise from the thought of man, free in their origin, necessary in their relations. As *we* can create the thought of a circle or a straight line of any magnitude, or having any direction we please, but cannot think of a straight line which shall cut a circle in more than two points, and are thus limited in our own action by the forms dependent on our will, so may the Divine action be at once free as our affections demand, and limited as our reason requires.

We have dealt hitherto with the primitive elemental operations of thought. But thought does not stop there. It *uses* the elements thus formed for more comprehensive purposes. This is the course of our own thoughts in the sphere of pure mathematics. We construct ideal judgments, such as the thoughts of a triangle or a circle. We study these judgments till we comprehend their constitutive particularities. Then we bring two or more of them into different relations, and investigate their mutual action. In this operation the design really present in every ideal judgment begins to come to light. But the teleological character of our judgments is usually masked for us, by the necessity of drawing the means for executing our purposes

from the storehouse of natural forces ; so that the thought of design becomes involved with the thought of using instruments supplied by some will other than our own. The problem or the plan is committed by us to black and white, and stands before our eyes while we study it. But this is only an accident. The design manifested in the use of materials depends only on the fact that the materials have a character of their own independent of the will manifested in their employment. Now we have seen that this character belongs to all our ideal judgments ; and it would not be lost if we could employ any of these judgments as materials for realizing our purposes. The design displayed in a picture would not be affected, if the painter were able to produce the colors he uses by the action of his thought, instead of only conceiving the kind of action by which they may be produced.

That the *Power displayed in the production of organized beings* has a personal character, is the less open to question, because its action is directly analogous to that of our own intelligence. The means used to act upon the primitive agents are at present unknown to us : but the results are similar to our own action. The plan is free : its execution is limited by the nature of the materials employed. No necessity can be assigned restricting the endless forms of vegetable or animal life, except that law of thought whose trace we have followed through their intricate mazes. But all organized being depends upon conditions of heat, light, gravitation, chemical relations, etc., etc., as much as do any human works. A frosty night is as fatal to the growth of a plant as to the setting of a wall. We have every reason therefore for assigning to this Organizing Power a *personality* which must be *distinct* from that of the Power manifested in producing the primitive elements, inasmuch as it has distinct objects of thought, and manifests in this distinction a new and most profound phase of the principle of opposition. Ac-

According to the views here enunciated, the Primitive creative action fills the universe with an endless repetition of *similar* forms, each preserving its own fixed character by a perpetual succession of recurring changes; while the Organizing creative action moulds these elements into an endless variety of *distinct* forms, deriving their unity from slowly changing yet accordant types. In the first case the end disappears in the means; in the second, the means stand subordinate to the end.

Yet each of these actions implies, and is the complement of the other. The Power which produces the materials suitable for an organized creation must have this creation as its ultimate end. The Power which uses these materials must adapt its work to the means supplied. Each of these Powers therefore stands to the other, in a relation different from that of either to the particular existences formed by its acts. The work of each depends on its own will. The conjoint work depends on the concord of the two wills; that is to say, on a principle of union common to both. Now this principle considered in itself, assumes the form of a *Spirit of Unity*, distinguishable as a separate *hypostasis*¹ from the two first, because it has a distinct object of action in the individuals produced by them; though, apart from this action, it must appear to merge in their action.

Thus we obtain as *the scientific expression for the power manifested in nature*, the conception of a Trinity in Unity; which, while it satisfies in the most complete manner the religious apprehension of the Divine as a conscious loving will, is also the most appropriate expression for the scientific conception of the Divine as the principle of law and order. For, that two wills may be able to accord in their action, each must understand the other; that is to say, each must be regulated by fixed laws or principles of knowledge, intelligible to the other. Again, that two

¹ The Greek word inadequately translated person in the Nicene Creed.

distinct actions may accord, the wills producing each must have like desires. Now desires, accordant though distinct, constitute perfect love. So that the conception of the Trinity, when translated into philosophical language, declares, (1) that the Divine Being always acts by *law*; (2) that this law is the utterance of *love*.¹

It is interesting to mark the steps by which we arrive at this result. For they depend on the conjoint operation of our two guides—the law of thought—and the study of nature; confirmed by—the study of ourselves. The law of thought has led us to see in the primitive action of thought the production of the “other” of itself: a creation opposed in its principle of action to the Creator. The study of this law in nature leads us to see a deeper opposition of the Creative Power within itself, where the distinction of function implies a unity of principle. If the shell of the universe is formed by the self-assertion of individuality, its kernel is the ever-living spirit of perfect unity. And the character thus manifested responds to the profoundest impulses of our own being. So we gain a deeper insight into the nature of the thinking principle than the study of its law only within our own minds affords. But the insight thus gained fits in completely with our former conclusions. The study of the law of thought carried us to the thought of that which wills, as the perpetual source of that which can be known. But what is that which wills, in its essence? The answer originally deduced by us from the law of thought was, that which loves. Now, the conception of love requires that different wills be thought of as according in

¹ To borrow the expressive language of a modern divine, “In the doctrine of the Trinity the one God is set forth as simple unity, and yet no barren abstract point, from which every possible idea we can have of life and mind and moral being has to be shut out; but as infinite fulness, the seat of Personalities distinct but altogether undivided from each other, containing in Himself relationship, intercommunion, and all the reciprocation for an infinite and eternal love.”—Tracts for Priests and People, ix. 50.

one spirit. And to the conception of such an accordance the study of nature brings us, by a road independent of the law of thought. The processes are distinct: their agreement must strengthen our confidence in their common result.

Thus the essence of the Divine nature is a *spirit of harmony*. It is a principle producing a unity of results from the orderly accordance of diverse action. If our conception of the nature of an atom be correct, this principle is involved in the primal manifestations of the Divine power, no less than in its most complicated works. For every atom, according to our suppositions, is a unity of diverse movements harmonizing with each other. We have seen also that this principle of harmony is the characteristic of that governing will in which our own "me," our true humanity, consists. So that human nature is prepared by its constitution for union with the Divine nature. What *Man requires for his perfection, God is in his essence*: whence, if the Divine Being should manifest its own essential character in a human form, it would manifest also the essential character of the humanity it assumed. If the crown of manhood consists in a sympathising will, which governs all our natural instincts by harmonizing each with all the rest, allowing none either to crush or be crushed, it is quite consistent with human nature that this will should be manifested in its perfection in some one man, who must thus become the type of true humanity, and the spiritual head of the human race; uniting in one person those qualities of tender affection and immoveable purpose, which, divided in mankind in general, form the distinguishing features of the female and male characters.¹

¹ See J. S. Mill, *Dissertations and Discussions*, i. 286. He quotes, and apparently endorses, the opinion of the author of "Letters from Palmyra," that "one of the innumerable great purposes of Christianity was to abolish the distinction between the two characters, by teaching that neither can be really admirable without the qualities supposed to be distinctive of the other; and

exhibiting, in the Person of its Divine Founder, an equally perfect model of both."

Strauss has objected to the conception of the Incarnation, that the Divine idea embodied in man cannot be realized except in the human race as a whole. (Dogmatik, ii. 214-230, § 66.) But this is to confuse the infinitely varied capacities of man with that governing will, without which, as Aristotle has told us, he becomes only the most formidable of beasts: τῶν θηρίων δεινότατον, Eth. Nicen., vii., § 1, 6; Pol., i., § 8 end.

CHAPTER XVI.

The Principle of Development.

THE interpretation of nature according to the principles applied in the preceding chapters leads us to a conception which has of late years assumed a continually increasing importance, both in philosophy and in theology, namely, the conception of a law of development pervading all existence. Dr. Newman has applied this conception to account for the great apparent differences between the Christianity of Rome in the nineteenth century, and the Christianity of St. Paul's Epistle to the Romans in the first. Mr. Darwin has applied it to account for the succession of vegetable and animal life upon the earth. Mr. Herbert Spencer lays it down, under the name of evolution, as the principle of all existence.¹ The author of the "Vestiges of Creation" has dealt with the same problem on the same supposition under somewhat different modifications. Miss Hennell invokes its aid to infuse religious life into the philosophy of Feuerbach.² Mr. Buckle demands its assistance to explain the progress of civilization. It plays an important part in the metaphysical systems of Schelling, Hegel, and Schopenhauer. We catch echoes of it from all sides, and cannot doubt but that this conception must exercise a great influence on speculative thought in future.

That this should be the case is not wonderful, since we see the principle of development at work before our eyes

¹ First Principles.

² See her Aids to Faith; not to be confused with the anti-Essays—Aids.

in all organized existence. But if we compare the nature of the operations thus conducted, with the effects commonly ascribed to the principle of development in the theories noticed above, we shall find a striking difference between them. The development discernible in nature, is only the bringing to light a new manifestation of forces already existing, with the same characters, under some other manifestation. The seed developes into a plant; but it is itself the last product of a similar plant. The intelligent power of the child grows up under our eyes; but the same kind of power has already been displayed by its parents. The development does not educe any faculty of a kind unknown before. Nor does the development of thought, through the progressive accumulation of the materials of knowledge, change the conditions of thinking or learning, though most materially affecting the results attained.

"Besen werden immer stumpf gekehrt
Und Jungens wird geboren,"¹

says Goethe; and expounds his meaning to be, that, "however much the world advances as a whole, youth must ever begin from the beginning, and pass as individuals through the epochs of the world-culture." And we cannot doubt but that the world-wise poet was right. However wonderful the achievements of thought, we have no reason for supposing the operation of thinking to have been ever different in kind from what it is now. The superstructure of science, vast as it is, has been reared by the same process which laid its foundations, though applied under other circumstances. Men learn to understand more fully all that lies in certain conceptions; but the operation of attaining such an understanding does not change its character by this development.

¹ "Men will be born babies still, And brooms when they're used will wear out." Eckerman, *Conversations*, i. 297.

Now the theories of development above alluded to assume that this process, in its application to certain cases where we can only imperfectly follow it, may produce an effect which we never find it to produce where we can follow it, namely, that, of giving rise to a product entirely different from any manifested in the being developed ; or of entirely changing its characteristic features. They assume, for instance, that conscious intelligence and will may be developed from an existence destitute of conscious will and intelligence ; or that religious thought may so change its character by its development, that, in place of resting upon a Being higher than itself, it shall rest upon itself as the highest form of being.¹ It is not difficult to see whence this application of the principle has been derived. Men have applied to nature as a whole the conception of the process of growth exhibited in organized beings taken individually. The seed entirely changes its character as it develops into a plant, or the child as it develops into a man. So, they have inferred, may the universe or the race of man do. But the form or forces exhibited by the plant or the man are not products new in their kind. They existed as a condition previous to the formation of the seed or the child. Observation therefore does not justify the application of this conception to account for the appearance of new kinds of powers. Nor are we further advanced by the attempt to conceive how such a development could take place. On the contrary, if we try to attach any distinct meaning to the thought of development, we shall find that it is only a name for the manifestation, in space and time, of that which has previously existed in intention. In other words, since thought always manifests itself in space and time, the process of development is only a name for the manifestation of thought.

¹ This remark does not apply to Dr. Newman's theory of Christian development. He takes great pains to show, that what Roman Catholicism is in its full growth such the Christianity of the earliest ages was in germ.

That this is the true conception of the nature of development may be further shown by comparing it with the conceptions expounded by Mr. Herbert Spencer, with a vast wealth of varied illustration, in his "First Principles," where he seeks to educe the universe from the opposite processes of (1) differentiation, *i.e.*, the passage of the homogeneous into the heterogeneous; (2) integration, *i.e.*, the aggregation of the differentiated units into a complete whole; accompanied by the consolidation of the parts forming these wholes, and therefore by an advance in their heterogeneousness, a process most perfectly shown in what we call organization.¹ The principle of *evolution* thus stated, expresses what we have found to be the law of thought, namely, the separation of the general into the particular, and the combination of the particular into the individual. To complete Mr. Spencer's descriptions we require only a reference to the principle of opposition, apparent alike in the double process and in every part of it, though inevitably overlooked by him; since he founds his theory upon the axiom that the nature of the power thus evolved is absolutely unknowable, because at the end of every road by which we strive to penetrate to a knowledge of it, we are arrested by contradictories; in other words, because we come always upon the traces of thought; to those opposites of cause and effect, substance and accident, freedom and necessity, internal and external, so reasonable when contemplated in their connexion, so absurd when contemplated in their separation.

"Naturam expellas furcâ tamen usque recurrit."²

In vain you attribute the universe to an "evolution" of the "unknowable," in place of to the action of intelligent will. When you have made clear to yourself what this

¹ First Principles, 148, 198, 214, etc.

² You may drive out nature, but she always returns.

evolution involves, you come to a process identical with the action of will and intelligence.

In a process thus conditioned, that periodical renewal of activity supposed by Mr. Spencer to take place at the close of each series of differentiation and integration is conceivable. It is conceivable that each universe has a limited epoch of duration involved in its constitution. If it begins by the differentiation of a diffused material substance into the opposite forms of suns and planets, it may end through the gradual cessation of this opposition. The ether, from whose pressure suns and planets arose, may, by its resistance to their movements, drive the planets one by one into their respective suns.¹ Thus the *end* of the primitive constitution of any universe, namely, the production of free conscious individuals, may become impossible; and the *means* for the accomplishment of that end may cease with the cessation of their utility. The whole concentrated mass may disappear, reappearing at the same instant in a diffused condition, fraught with the germs of a new "evolution."

That such a recommencement of life could take place, as Mr. Spencer imagines, in consequence of the dispersive force of heat engendered through the falling together of extinct suns, we apprehend to be impossible. To produce the enormous heat required, the collision of masses falling against each other with vast rapidity in *opposite* directions would be necessary. But whether we judge from theory or from the analogy of experience, the falling together of suns would generally be the falling together of bodies moving in the *same* direction. (1) According to the theory of evolution adopted by Mr. Spencer, as above stated, the matter of each sun in our stellar universe once participated in a common movement; and although in particular cases this movement may be conceived to have been reversed,

¹ See p. 169.

the reversal must be the exception. (2) According to the analogy of the solar system, the number of concurrent motions must very much exceed that of opposing motions. Consequently, when suns fall together, the force of their combined motion would be mainly expended in generating, not heat but an increased velocity of rotation, which cannot be supposed sufficient to overcome the enormous force of attraction due to the collective mass, so as to whirl its atoms into space again in disintegrated centres of energy.

The totality of concentrated forces therefore, once united, must for ever remain a dark, lifeless, whirling body, if they are not influenced by some power besides a mere principle of differentiation and integration. And since, in the infinite duration of time, this conclusion must have happened at an infinitely remote period, the existence of such a universe as we inhabit would be impossible.

It may perhaps be alleged, in opposition to this argument, that in different universes the directions of motion may be different, and that the collision of universes may thus effect what the collision of suns in any one universe could not. But this is only to mount the elephant on the tortoise. The abyss remains below. In infinite time every universe capable of coming into collision must have come into collision; and since the mass resulting from the diffusion of their elements would have acquired a common movement of rotation, all these universes must have already merged into a lightless, lifeless, rotatory blank.

Thus Mr. Spencer's conclusion that, "given the force manifested in time and space under the form of matter and motion, it is demonstrable, *a priori*, that there must go on such transformations as we find going on,"¹ appears to be an inference involving a fatal oversight. To justify it we need that, to the two confessedly inconceivable suppositions on which Mr. Spencer's system rests, namely,

¹ First Principles, 497.

that of the eternal persistence of an inconceivable cause of matter and motion, and that of a difference of organized beings arising without any difference in their original organizing principles,¹ there be added a third; that is to say, we must conceive systems of moving force uniformly to differentiate themselves into bodies moving in opposite directions, so as to produce a new differentiable material from the crash of ancient integrations. We must be allowed to consider as unsatisfactory, an explanation of existence reposing on three inconceivable assumptions, concerning its commencement, its unfolding, and its continuance.

Now, according to the results of our investigation, the free action of thought ought to manifest itself in the universe under three concurrent phases: (1) the *general* determination of the qualities of existing things; (2) the *particular* determination of the elemental unities of movement, furnishing the means of realizing these qualities; (3) the combination of these particulars into *individuals*, through whom the objects, thus qualitatively determined, may be quantitatively produced. The renewal of existence in a form suitable for a new development, when any particular universe had "played out its part," and become unfit for the production of individual life, would be a function of the first phase of thinking will, that is, of the general spirit which unites the particular with the individual. But these are exactly the three points where Mr. Spencer's theory falls foul of inconceivabilities. We infer, therefore, that his system requires for its "integration," the acceptance of thinking will as the power whence the phenomena observed in nature arise.

Mr. Spencer appears to us to have confused the eternal with the endless forms of its manifestation. The infinite, as Mons. Victor Hugo strikingly says, must include the

¹ See p. 137.

"me," else it would be bounded by the "me."¹ Now the "me" is known to us as a thinking will. Assume this to be the essence of the eternal, and the "unknowable" depths where Mr. Spencer attempts to navigate his bark, become, not indeed *fathomable*, but *transparent*. Our scientific conceptions affirm the convictions of our instinctive faith, and rest confidently upon the arms of an everlasting love realized by thought.

All thought known to us is, and, so far as we can follow it, always has been a process of development, in which an ever-changing result has been produced by the continuous repetition of the same kind of action. The universe does, and, so far as we can trace back the course of time, always has exhibited the same kind of development: namely, changes slowly produced, through the ever-varying operation of the same kind of action which we can follow in our own consciousness. And science consists in the knowledge of the thoughts realised through the changes constituting this development. In the preceding chapters we have endeavored to trace this manifestation in its great outlines through successive phases of being, till it culminates in the production of a creature whose conscious freedom is capable of reflecting the image of his Maker. With the appearance of such a being the process is in a certain sense complete; or, rather, it enters upon a second stage. The universal, loving will, with which it began, and by which it is at every moment carried on, realizing its own love, through the "other" of itself, that is, through the formation of individuals whose love is self-love, has engrafted upon this principle its opposite; namely, a love which is not content to rest upon itself, but aspires after a spiritual union with the Source of all, and finds in that aspiration the secret of its own welfare. May we not say, that, as in the freedom of our own thought we have a

¹ *Les Misérables*, i. 125.

guarantee for our belief in God, so in this aspiration after his perfection we have a guarantee for the continuance of our own being. That is to say, the principle of development binds into a consistent unity of conception the three assumptions of Kant's "Practical Reason"—God, Freedom, and Immortality.

How this immortality can be combined with the principle of individuality involved in all existence, we do not know. Yet the discoveries of science, interpreted by the law of thought, help us a little, by teaching us to distinguish our universe into the opposites of sun and planets. Our present experience shows us that life is uniformly connected with freedom of movement, and with light. It shows us also that heat implies active movement. Therefore the sun, as the centre of heat and light, is pointed out by analogy as the probable seat of higher forms of organized being than those existing on the earth. And that our own planetary life should find its completion in this centre would quite accord with the analogies of development in creation, so far as we can follow them. Our solar universe subsists, through the opposition of the light-and-heat-receiving circumference to the light-and-heat-imparting centre. It is agreeable to the law of thought that this opposition should be reconciled, by the adaptation of these recipient worlds to train up beings whom the great central orb may receive from them; and for whose activity it may offer an appropriate sphere, fitted for the exercise of higher powers, and more enduring life.¹

¹ In reference to the possibility of organized intelligent beings existing on the sun's surface, we must bear in mind, (1) Mr. Nasmith's discovery, that forms apparently of an *organic* nature fill the sphere, which seems to be the immediate source of light and heat (see note at end of chap. xii.); (2) that, in the spots of the sun, we see through the bright solar atmosphere, into a space much darker, and therefore probably much less hot. The discoveries of Messrs. Bunsen and Kirchhof indicate that, beneath the outer atmosphere of the sun, there is a source of light so bright as to convert the rays of light emitted from iron and other substances existing in that atmosphere in a vaporized state into dark lines. But the question what the condition of the space seen within the spots may be, remains, we conceive, much in the same state as

when Sir J. Herschel declared that, "although the body of the sun, thus disclosed, *might* be in a state of intense ignition, it does not follow that it *must* be so." *Outlines of Astronomy*, § 396.

The hypothesis of the possible connexion of future life with the sun, is not inconsistent with the supposition that man's being upon the earth may be repeated. The souls of men may go through many grades of human life on earth, gradually becoming fit to use the loftier powers with which they are to be entrusted in the more intense regions of solar existence. The objection to that belief in the preexistence of the soul, which may almost be called instinctive—so extensively has it prevailed—drawn from the absence of recollections of the past, lose their force if the soul be simply a regulative will, connected with a cerebral organization, on which our faculties of thought or emotion regulated by this will depend as completely as our powers of motion or digestion depend on the organization of our limbs or stomachs. The faith in a personal immortality is thus associated with the conception of an ever-recurring freshness of existence, agreeable to the analogy of nature, and adapted to remove the grave difficulties connected with the ideas popular on this subject in Europe: the insipid monotony of *Il Paradiso*, unredeemable even by the genius of Dante; and the gross injustice of his *Inferno*. There is a natural equity in the thought that men will share in the effects of their own work; and that, as they have acted on society by their virtues or vices, so will it react on them in renewed phases of existence upon earth; till those who have gained all that they can learn here are transplanted into a sphere of higher powers. "Because thou hast been faithful in a very little, be thou ruler over ten cities" (Luke xix. 17).

The probable connexion of future existence with the sun was maintained by the late Dr. George Wilson, of Edinburgh (See "*Chemistry of the Stars*," *Travellers' Library*, 24, p. 45), who cites Mr. Isaac Taylor as another advocate of the same idea (*Ib.* p. 6). But he makes no allusion to that principle of opposition by which the theory is brought into accordance with the general character of physical phenomena.

For an account of the doctrine of preexistence, and the objections to it in its common form, see M. Nicolas, *Essais de Philosophie et d'Histoire Religieuse*. Paris, 1863, 164–209. The most serious objections are drawn from the confusion made in ancient philosophy between the soul of man and the principle of animal life.

CHAPTER XVII.

The Humility of Science.

It may perhaps be objected to the views of the relation between the action of human thought and the phenomena of sense presented in the preceding pages, that its tendency is to puff men up with a persuasion of their own greatness; that there is more humility, and therefore more truth, in the philosophy which, denying to man any power of penetrating to the essence of the phenomenal, reduces his aspirations to the careful study of what comes forth from the mysterious abyss of being. The objection is of a very questionable nature, since it reasons from the assumed moral effects of an intellectual proposition to its intellectual truth; but, if this mode of reasoning be justifiable, we are satisfied that the assumed effect must be reversed; that the more deeply men are penetrated by the conviction of nature being truly the expression of thought, the work of an intelligence analogous to human intelligence, and a will analogous to the governing will in man, the deeper will be their humility; the more ready will they be to turn to that which is not themselves, as their teacher. The conviction that the power displayed in nature is the same in *kind* with the human faculty of thought, will produce the consciousness of its immeasurable superiority in *degree*.

Much might be said in support of this proposition; but we will refer here only to the illustration of it, afforded by one of the most brilliant and original of our modern

writers. No one has displayed a more intense admiration of Nature, a more contemptuous disdain of all human work which turns away from her teaching, than Mr. Ruskin. And with this admiration is combined a sense of personality in her action, so strong that he may almost be said to live the ancient Greek faith over again, and see a Dryad in every tree, and an Oread shaping the mountain clouds. His feeling of the littleness of man keeps even pace with his feeling that the greatness of nature is a greatness essentially human.

In truth, what is that concerning the mysteries of existence of which we assume to have acquired any *knowledge*, by the line of argument carried on in these pages, beyond those profound discoveries forming the glory of modern science? Absolutely nothing. By the help of the wonders of the past, as they are unrolled to us in the researches of geology, and of the wonders of the present, as they are offered to us in the magnificent delineations of astronomy, or the grand conception of correlated forces, through which a Faraday, a Grove, a Tyndall, and their kindred spirits in our own or in other lands, have given or are giving unity to the marvels of Chemistry and her sister sciences, we have endeavored to throw a few rays of light into the profundity of the future, and to confirm that belief in a personal, conscious existence, connected in its character with our actions in the world of our present consciousness, to which the religious faith of mankind so tenaciously clings.

By the help of analogies derived from the study of thought, in our own minds and in the history of philosophical speculation, we have endeavored to show, in the great outlines of modern science, a unity, which that science at present seems to be seeking without having found; and by the same process to remove that sense of an antagonism between the spiritual and the material, whence arises the unacknowledged, but every day more evident,

conflict in our modern world, between the conclusions of thought and the demands of affection.

But in these efforts we lay claim to no intuitive perception of truths hidden from other men. We have simply applied the method of Bacon to a class of subjects which Bacon certainly would not have excluded from it, namely, to the relations subsisting between the great systems of thought whose skeletons are stored up in the deposits of human history. These we have sought to determine by considerations drawn from the operations of thought discernible in our own intelligence; as the geologist seeks to determine, by a similar study addressed to the forms of creatures now living, animal or vegetable, what are the relations of the remains of ancient life to existing organisms. And as, in that case, the investigation of this past, known only through the reflection of the present, has cast upon that present a wholly unexpected light, and is opening to us conceptions about ourselves which must most materially modify the notions hitherto prevalent among us as to our true place in nature, and the true characters of the nature wherein we are placed; so is it in this case. The investigation of the past of thought throws upon the operations discernible in our minds a light, whence they take a new aspect, and acquire for us a character hitherto generally unsuspected, of a profound analogy with the operations revealed to us in the universe by the investigation of the phenomena made known through our senses.

Such at least is our conviction. The grounds of that conviction we have striven, to the best of our ability, to set before our readers, and will not now attempt to repeat them. Our object in these observations is only to disavow the imputation of claiming to unfold a system of transcendental knowledge; or of consciously departing in our inquiries from that method of research founded

upon the examination of ascertainable facts, to which Bacon gave celebrity as a theory, and which the history of modern science has proved to be the only sure road to truth.

CHAPTER XVIII.

Conclusion.

IN concluding the present investigation, it seems desirable shortly to point out the differences between the view of the source of natural phenomena advocated in these pages, and the speculations advanced upon the same subject previously to or contemporaneously with those of Professor Challis; such, for instance, as the conception of Mossotti, favorably noticed in Mrs. Somerville's work on "The Connexion of the Physical Sciences," that each particle of matter attracts and is surrounded and attracted by an atmosphere of ether, while it repels other particles of matter, though with less force than the atmospheres repel other atmospheres; or the conception of Boscovich, adopted by Kant, that natural bodies consist of attractive and repulsive forces grouped around central points; or that recently proposed by Mr. Birks, that matter consists of monads, or moveable centres of force, unextended, but definite in position, which attract each other with a force varying inversely as the squares of the distances between the centres, while each attracts round itself particles of ether, whose action upon each other is repulsive.¹

All these conceptions are open to the objection that they explain the unknown by the unknowable. We are so familiar with the thought of bodies perceptibly attracting or repelling each other; this thought is so clear and conceivable, as a statement of the observed phenomena and a

¹ Matter and Ether, pp. 8, 9, 43.

basis for calculating the relations between them, that we are apt to overlook the fact of the kind of action supposed being in *itself* utterly inconceivable. It is impossible for us to form any idea of the nature of an attractive force; of an action by which one body can draw to itself another body whose parts are external to the body drawing it. And this difficulty is as great, though not as striking, if the bodies are supposed to be contiguous, as if they are supposed to be remote from each other. The difficulty lies in conceiving how the attraction can exist at all, not in supposing that, if it exists, it may be widely diffused. It is equally impossible for us to form any idea of a repulsive force exerted in any other way than by one body striking another body in contact with it, and driving it away; and of the repulsion thus caused spreading round the original centre, by movements propagated from one body to another.

Mr. Grove most truly observes, in the passage quoted in chap. xii. from his profound work on the "Correlation of Forces," that the only force of which we can distinctly think is motion. When we attempt to explain sensible phenomena in any other way than by the results of movement, we deal with words unaccompanied by any intelligible thought.

The theories we have noticed, and all other theories which assume the existence of forces primitively attractive or repulsive, are valuable only as data whence to calculate observed phenomena. They afford us no help towards making the existence of the phenomena intelligible to our thoughts. But the case totally alters when we seek for the origin of the phenomenal, as has been attempted in these pages, in the relations of the opposites of motion; that is, in the action of centres of movement fitted to impart motion, upon centres of movement fitted to receive and distribute it. For, though it may be alleged that the production of motion is in itself inconceivable, this inconceiv-

ableness is certainly not of the same kind as the inconceivableness of a force supposed to be in itself attractive or repulsive. We can form a perfectly definite conception of a movement beginning from any given centre, and returning into itself. We can assign in thought a certain amount of energy to any such movement in comparison with any other similar movement.¹ Thus we obtain a distinct basis for reasoning about the origin of sensible phenomena; and the difficulty of conceiving them to be produced is reduced to the difficulty of conceiving how these movements can occupy space.²

¹ This energy would be measured by the *quantity* of movement in any atom, *i.e.* the space traversed by its parts when free from the action of other atoms, in a given time; and, as we have seen, would be constantly restored by the reaction of the motions caused by it. The restoration of the motion lost by impinging on a resisting medium, such as the ether, must not be confused with the continuance of the moving force. That requires a perpetual act of will to determine it in each successive moment of time. But if the force exerted in *overcoming* resistance was not restored, there would be needed a constant supply of additional force beyond the force measured by the original motion. Then arises that puzzling question, what *becomes* of all this force; from which we are delivered by the conception of the conservation of force due to the principle of opposition involved in the circular character of the primitive motions. See p. 163.

² The opinion expressed here as to the relative values of the hypothesis proposed by Professor Challis in order to give unity to natural phenomena, and other similar attempts, is to be confined to his resolution of attractive and repulsive forces into the results of oscillations, or wave movements, produced by what is called matter in what is called ether. The explanations of particular phenomena given by the Professor must rest upon their own merits. We do not pledge ourselves to assert their superiority in all respects over those deduced, by Mr. Birks for instance, from the rotations of molecules composed of the primitive or elemental atoms. On the contrary, the solutions given by him in the work cited, appear to us to be full of valuable suggestions; while they touch upon subjects of very great interest not yet handled by Professor Challis. Our objection lies to the assumption of forces in themselves attractive or repulsive, whence Mr. Birks derives his molecules. We may observe also that, after all, Mr. Birks does *not show how his molecules could acquire the varied peculiarities of structure*, wherein he seeks his explanation of chemical phenomena: while the theory of Professor Challis, when modified by the suppositions as to the constitution of atoms made in these pages, makes it possible to conceive how different chemical elements can be formed of atoms substantially similar, so as to be, as Mr. Birks contends they are, multiples of hydrogen. For if the specific differences between different atoms consist only in slight differences of spherical form, and in the different relations of the ethereal currents, caused by their proper motions and leading to peculiar modes of combination among them, every atom, when *isolated* from its fellows, would exhibit the same kind of action; in other words, if an

Why there is this difference between our conception of motion and our conceptions of attractive or repulsive force, appears from the investigation into the nature of thought contained in the first part of this work. Our power of thought is a constructive faculty. It acts by producing thoughts of movements and their combinations. So that these thoughts put into words what we are always doing, and consequently *know* to be capable of being done. But the conceptions of attractive or repulsive forces do not express any action of which we are conscious. They are merely words stating certain external relations observed among things, and in no degree explain the nature of the power concerned in producing the things thus observed.

The same considerations show also why the force ascribed to any assumed centre of motion can be conceived only in relation to that ascribed to some other centre: namely, because though *thought* is essentially absolute, *thoughts* are essentially relative. In truth, our conceptions of moving force are intuitive; statements of a matter of which we have a direct knowledge, so that the alleged inability to conceive how motion can be produced, would be only another name for an inability to conceive how existence is possible. But does this inability exist?

That the power of thought, that is, of determining motion, should begin to be, is absolutely inconceivable. And this inconceivableness is not a consequence of experience. On the contrary, we feel it, although thinking

atom of hydrogen be the atomic unit, every such isolated atom would show the characters of hydrogen. And yet, so soon as many of these hydrogen-like atoms came together, they would enter into the combinations due to the peculiarities of their respective constitutions, and reappear as members of some special chemical element, or union of elements. Further, Professor Chalkis' theory furnishes, in the repulsions produced among the ethereal atoms by the movements propagated from the material atoms, that "uniform repulsive force," varying in a ratio double that of the force of attraction (Matter and Ether, 25 and 185), which Mr. Birks employs as the principle agent in many of his explanations: (see Phil. Mag., Feb. 1860, 90; Oct. 1860, 281). So that it is possible upon this theory to retain Mr. Birks' explanations of natural phenomena from the effects of the forces assumed by him, unembarrassed by their ascription to an inconceivable cause.

individuals daily come into being under our eyes. On the other hand, if this power be assumed to exist, we have no difficulty at all in conceiving that any particular movement so determined may begin or cease at any moment. That which we cannot conceive, is that the *power* of determining the movement should either begin or cease. In other words, in this power we have an immediate intuition of the eternal.

Again, it is inconceivable that this power of thought should be exerted without occupying space. For, as we have seen, it is the essence of our own thinking power to occupy space, that is to say, the *space created* by itself. The occupation of space by the power observed in nature is therefore the exact analogue of the action of thought made known to us by consciousness, with which we have identified the forces of nature by resolving them into different combinations of motion.

Thus, in the conception that existence arises from the action and reaction of unities of movement, we come to an absolute ground of certainty; to the certainty of intuition; to a thought which cannot be thought away, namely, the thought of the power of thinking. To say that the action of God in nature occupies space, and produces combinations of movement, is only to say that it is the manifestation in the universe, of the same kind of force which we know to exist by the immediate affirmation of our own consciousness—the force of will limiting and limited by thought.¹

¹ This, as has been intimated above, is that inconceivable "force," on whose "persistence" Mr. H. Spencer justly insists, the "ultimate of ultimates," "the unknown quantity," which, according to him, must ever remain unknown, because there is nothing in which its value can be expressed (First Principles, 236). The mysterious stranger turns out to be our best known friend. Procris has returned to Cephalus, and regained his affections under a disguise. But as he gazes on her the familiar lineaments reappear. The dew of faith again refreshes the weary limbs of the all-searching reason; (see Lempriere, Mythology; Max Müller, Comp. Mythol., Oxford Essays, 1856, 53, 55). The mystery of *force* is the mystery of *will*; which ever produces the primal opposites of being, according to the law of thought, by first dis-

It may perhaps be objected that, to resolve the universe into the action thus intuitively discerned, does not make existence more conceivable, because *we* cannot actually occupy space by our thoughts, but only think of it as occupied. But this difference between our thoughts and the Divine thought, is so far from being a difficulty to our theory, that it is logically deducible from it. It is only a way of asserting, what all other experience shows, that our individual existence is not determined by our *own* will. If we could convert the ideal space constructed by our thought into real space, and out of the unities of movement determined by our thoughts in this space, could construct beings capable of thinking, the thought of these beings who, *ex hypothesi*, would be upheld by our thoughts, could not *occupy* the space which *we* had constructed; for to do this, their thoughts must exclude our thoughts: the dependent must shut out that whereon it depends; which is absurd. Consequently, this derived power of thought could be only ideal. The constructions raised by it must be confined to the mind of the thinker. His thoughts of the nature around him could be only the reflection, more or less perfect, of that thought by which this nature was produced: an image of this reality, not the reality itself.

Now the relation which can be thus hypothetically traced as the only conceivable relation between ourselves and any thinking being supposed to be upheld by our power of will and thought, is the precise relation subsisting between ourselves and that power by which we are upheld, if, as has been contended, this power be a thinking power. The objection combated by us is therefore a creation, not of the critical reason, but of the uncriticising imagination. As has been already intimated, were it worth anything, it would prove, not that we are inca-

tinguishing lines of motion, and then combining them into unities, where movement eternally wedded to repose generates attraction from the reaction of repulsion.

pable of conceiving how the phenomena of existence can be produced, but that our consciousness of existence is a delusion.

Unless we are prepared for such a conclusion, there is nothing in the difficulty here noticed to prevent our resting on that conception in which, Necessity and Freedom, the Mechanical and the Dynamical, the Real and the Ideal, the Material and the Spiritual, meet, and are reconciled; the conception that the *Universe is produced by a Being* whose *essence* is *Loving Will*, and whose *manifestation* is *Realized Thought*.



APPENDICES.

APPENDIX I.

*The Relation of Mathematics to Metaphysics.*¹

THE origin assigned in the preceding pages to the thought of space, furnishes a simple explanation of the foundation of mathematical reasoning—I. Geometrical; and II. Analytical.

I.—(1) If the conception of a straight line be that of a point moving from a centre in a uniform direction, it becomes evident that two straight lines cannot enclose a space. For the point of intersection of any such lines is the centre, whence they start in directions conceived as divergent.

(2) Again, it is evident that straight lines which cannot cross, must be conceived to be produced by points moving from different centres in similar directions; and since every straight line crossing two such parallel lines must have the same inclination to each, that is, must make equal angles with each, we obtain a convenient substitute for the eleventh axiom of Euclid, that *belle noire* of geometers.

(3) The different geometrical figures, the triangle, *i.e.*, the figure formed by *three* straight lines mutually crossing; the parallelogram, *i.e.*, the figure formed by *four* straight lines crossing in two pairs; the pentagon, *i.e.*, the figure formed by *five* such lines, of which each crosses the two next; and the subsequent regular figures will arise from the application of our two great principles, (1) opposition; (2) variation, the perpetual tendency of each ideal judgment to pass into the judgments immediately opposed to it. By the endless multiplication of angles and diminution of the angular inclination, the thought of the many-

¹ See note at the end of chap. iii.

sided figure passes into that of its opposite, the thought of the *curved line*, which will be considered below.

(4) The force of the ancient definition of a plane surface, viz., "that in which, any two points being taken, the straight line between them lies wholly in that surface," becomes apparent. Trendelenberg has suggested that the thought of a plane surface is obtained by conceiving a line to move sideways, as the thought of a line is obtained from that of the motion of a point. But to this explanation it may be objected that it does not naturally account for the formation of any surfaces but squares or parallelograms. We apprehend the conception of a surface to have originated simply from the constructive action of thought in realizing the conditions under which one straight line can be conceived to intercept two others. That on which three such lines could be thought of as drawn was a surface; and from combinations of surfaces limited by such lines the geometrician proceeded to construct his solid figures.¹

(5) Euclid's rule for estimating the contents of a plane rectilinear parallelogram, by multiplying its height into its base; or those of a rectangular solid, by multiplying this area by the side of the solid, is freed from the objection brought against it by Trendelenberg and others, that to obtain surfaces by multiplying lines, or solids by multiplying surfaces, is illogical. If the surface or the solid are thought of as constructed by the self-limiting movement of thought, which then proceeds to *measure* them, the rule is perfectly rational.

(6) We reconcile Kant's doctrine that the axioms of mathematics are synthetical judgments, with Dugald Stewart's doctrine that they are definitions. A definition must define something: but Stewart shows nothing to be defined. He speaks of these axioms as expressing "the component elements without which the faculty of reasoning is inconceivable and impossible."² But conceiving thought to be only a power of generalizing by means of so-called "abstractions" from the phenomena of sense or emotion, his definitions were definitions of mere emptiness.

¹ The generation of a surface from a line may be vividly realized by conceiving the straight line produced by the movement of a point from a centre to revolve round that centre.

² Elements, ii. 28.

This *something to be defined* Kant supplied, declaring it to be the forms given by thought to the materials supplied by sense. But, in treating the axioms of mathematics as primitive acts of thought, and therefore calling them synthetical judgments, he disguised their true nature. The axiom that two straight lines cannot enclose a space expresses the result of an analysis applied to a previous synthesis, namely, the constructive operation of thought in bringing the two straight lines together. But this synthesis is only the simplest case of the universal action of thought. The judgment of equality, that two things equal to the same thing are equal to each other, depends, in like manner, upon the consciousness of exact similarity in two constructive acts. Men probably first became conscious of this similarity by actual comparison. But to make such a comparison we must first bring together in thought the things to be compared. The hand will not act except the mind directs it. The introduction of the common measure has no other object than that of concisely declaring that the objects compared must be brought together. That it is not an essential part of the judgment appears by the axiom concerning the addition or subtraction of equals, where the reference to a common standard disappears.

II.—The application to curve lines of the principle of opposition, clears up the foundation of the Calculus of Differences, which has been employed since the time of Leibnitz in the investigation of these lines, with results, whose brilliancy sufficiently justifies the process; though its theoretical basis remained in an unsatisfactory state, until Hegel pointed out that the curve line, the infinite of the infinitesimal calculus, is the *limit* in which the primitive opposites of quality and quantity unite. A few words will illustrate this position. The *quality* of a straight line consists in its direction; and is measured by the *quantity* of angular difference between it and any other given line. The *quantity* of the line is measured by the *continuance of its quality*; i.e. the length of space through which it preserves its particular direction. Now, in a curve, the direction of the line momentarily changes, that is, its *quantity* is transformed into *quality*. On the other hand, its *quality*, or angular inclination, momentarily increases or diminishes, that is, it is transformed into *quantity*. And these opposites combine in the con-

ception of the relation between a moving and a fixed point; of which the relation or ratio between the ordinate and the abscissa affords the *measure*, and thus defines the curve.

In referring mathematical certainty to the result of analysing the constructions of thought, we do but state in an intelligible form, the proposition opposed by Mr. J. S. Mill to the conception that this certainty is derived from the "noetic faculty or intelligence proper." "One of the characteristic properties of geometrical forms," says Mr. Mill, "is their capacity of being *painted* on the *imagination* with a distinctness equal to reality. This in the first place enables *us* to make (at least with a little practice) *mental pictures* of all possible *combinations* of lines and angles, which resemble the realities quite as well as any we could make on paper; and, in the next place, makes these pictures just as fit subjects of geometrical representation as the realities themselves."¹ Now since *we* certainly do not *paint* these *mental pictures*, or produce these *combinations* on our imaginations with our *hands*, what is this but a statement that we produce geometrical forms by a constructive faculty belonging to our *thoughts*? Here, then, we have the admission of that characteristic of thought, which at once lays a solid foundation for ideal philosophy, and reconciles it with the so-called real philosophy.

That this constructive faculty is originally set in motion by the action of the senses upon our minds, we will not dispute. Nay, we will allow to Mr. Davies and Sir W. Hamilton, that the world of sense does offer to thought "lines without breadth" in the "edges of colors;" as it offers lines of perfect straightness in the rays of the sun, and forms of rounded curvature, at least apparently perfect, in the discs of sun and moon. That this world should be adapted to educate thought, is no marvel, if, as we contend, it be itself the utterance of a thinking Being. But the question is not how does the mind acquire the powers it possesses, but what powers does it possess? We agree with Mr. Davies in holding that the "cognitive faculty" must have a something to "cognize." But what is this something? We apprehend it to be always that which this cognitive faculty

¹ Logic, i. 261. See Davies, A B C of Thought, 118.

constructs for itself. And of this fact, geometrical reasonings offer the most convincing proof from their simplicity, and their perfection. The circle on which we found our demonstrations is not the circle drawn with pen or pencil, but, as Mr. Davies admits, a circle in which "the inseparable accident which mars its perfections, is conveniently lost sight of, and the external form invested with all the completeness of its ideal."¹ But whence comes this ideal? "Abstracted," in the ordinary sense of the word, it cannot be; for there is nothing to "abstract" it from. Take away, in thought, the breadth from your line of pen or pencil, and you will have an outline full of irregularities. You create one where these irregularities disappear. In virtue of what power? Is there any other answer possible than our answer; in virtue of the constructive faculty of your thought; that ideal faculty of whose constructions the circles formed by your hands are the feeble and imperfect expression.

¹ A B C of Thought, 123.

APPENDIX II.

The Order of Connexion among Judgments and Syllogisms: and the Distinction of Inductive and Deductive Reasoning.

THE order of the twelve judgments, which form the foundation of logic, is deduced in the preceding inquiry from the natural order of thought, in dealing, *first* with the judgments concerning being; *secondly*, with those concerning relation; and *thirdly*, with those where these thoughts combine. Kant has not observed this order. His arrangement is as follows:

CATEGORIES.		MOODS.	JUDGMENTS.
Unity.	}	I. Quantity.	Individual.
Plurality.			Particular.
Totality.			Universal.
Affirmation.	}	II. Quality.	Affirmative.
Negation.			Negative.
Limitation.			Endless.
Substance and Accident.	}	III. Relation.	Categorical.
Cause and Effect.			Hypothetical.
Action and Reaction.			Disjunctive.
Possibility and Impossibility.	}	IV. Modality.	Problematical.
Being and not-Being.			Assertatory.
Necessity and Accidentality.			Apodeictic.

But as Kant does not deduce the order adopted by him, it is needless to discuss it. Not so Hegel. He deduces his order; and as this differs in some important respects from that adopted in the present inquiry, we propose shortly to investigate the character and grounds of the difference. Hegel's order is as follows:

I. The judgments of quality, with the three phases of (1) affirmation, (2) negation, combining in (3) limitation.

II. The judgments of reflection, with the three phases of (1) unity, (2) multiplicity, combining in (3) totality.

III. The judgments of necessity, with the three phases of (1) the categorical, (2) the hypothetical, combining in (3) the disjunctive.

IV. The ideal judgments, namely, (1) the assertatory, (2) the problematic, combining in (3) the apodeictic.

It will be seen that this arrangement differs from that adopted above, 1st, in the transposition of the divisions III. and IV.; 2nd, in the transfer, within the judgments of necessity, of (1) to the third place.

Now the order adopted in this work is borne out by the spontaneous acts of thought expressed in language. Judgments, as is shown in Appendix III., form two great natural classes, 1st, those in which the subject is included in and leans upon the predicate; 2nd, those in which the predicate is included in and leans upon the subject; and these classes are distinguished by the application of the distributive words "all" or "some" to subject or predicate. But the three judgments called by Hegel "ideal," fall under the 1st class. On the other hand the disjunctive judgment falls under the 2nd class, together with the judgment called by us ideal—while, between these classes, comes the hypothetical judgment, where the words "all" or "some" may be indifferently applied either to the subject or the predicate.

For instance, to take Hegel's examples of (1) the assertatory, (2) the problematic, and (3) the apodeictic judgment, it is clear that we must say;—

(1.) "All" or "some" of these houses are good;

(2.) Considered in this point of view, "all" or "some" of these houses are good;

(3.) "All" or "some" houses, built in such and such a manner are good.

And that we cannot say,

These houses are "all," or "some" good, etc.

On the other hand, in the disjunctive judgment, we may say,

A is some B, all C, some D, etc.; or,

A is all B, all C, all D, and nothing else; commonly expressed by either B, C, or D.

So in the ideal judgment, we may say,

Triangles are all those plane figures which are formed by three straight lines mutually intersecting.

But we could not say,

"All" A, or "some" A is B, C, D, etc. ; or,

"All," or "some" A is either B, C, or D ; unless we convert the disjunctive judgment into a problematic judgment, and mean, A is one of these things, either B, or C, or D.

Nor could we say,

All triangles are those plane figures, etc.

Lastly, in the hypothetical judgment, we may say, either,

If "all," or "some" of these things are so, this or that will be so ; or, If this or that is so, "all," or "some" of these things will be so.

To disarrange this natural order of judgments cannot be justifiable.

That Hegel's arrangement is a mistake, is further shown by examining the grounds assigned by him for it. He finds them in the subject-matter of the different judgments. "Ideal judgments," he says, "relate to matters where we judge things by their absolute natures, by what they "ought" to be, as good, bad, true, false, beautiful, ugly, etc." Now the thought of "ought" is no doubt connected with that of good or bad ; but the judgment, "this house is good," does not call up that thought more than the judgment, "this bridge is strong." Each judgment conveys the thought that the quality named, the goodness or the strength, is in some way connected with the constitution of the house or bridge ; but it does no more. Again, the judgment "If this house has stone floors it will be fire proof" is as much a problematic judgment as "the house considered from this point of view is good." Yet it expresses neither approval, nor disapproval, but simply states a fact.

It appears, then, that the third and fourth of Hegel's groups of judgments should be transposed. That this transposition is required, may be shown also by comparing his groups of judgments with his groups of syllogisms. They are as follows :—

JUDGMENTS.		SYLLOGISMS.	
B.	{ Categorical.	A.	{ Reflective.
	{ Hypothetical.		{ Inductive.
	{ Disjunctive.		{ Analogical.

JUDGMENTS.	SYLLOGISMS.
A. { Assertatory. Problematic. Apodeictic.	B. { Categorical. Hypothetical. Disjunctive.

It is obvious that groups A and B are transposed, either in the judgments or in the syllogisms. But Hegel's order of the groups of syllogisms agrees with that given by us; and thus he testifies against his own arrangement of the groups of judgments.

Now, if the correspondence between groups A and B of judgments and syllogisms respectively is admitted, our arrangement of the syllogisms in group A must also be admitted as the correct one, in opposition to that given by Hegel. For the assertatory judgment (1), the problematic (2), and the apodeictic (3), respectively correspond:—

(1) To the syllogism of analogy, which *asserts* the existence in individuals of principles of unity beneath their individual diversities;

(2) To the syllogism of induction, which infers that certain consequences will follow *if* such and such a typical relation does exist in any case;

(3) to the syllogism of reflection, which points out that this relation does exist in a particular case, and *therefore* that these consequences do follow.

Lastly, the transposition of the ideal or pure categorical judgment, to the end of the series of judgments, is borne out by the proof given by us, that the common categorical *syllogism* rests upon the apodeictic judgment, which is really double, and forms the foundation by its first half for the syllogism of reflection, and by its second half for the common categorical *syllogism*.¹ For thus the categorical *judgment* has no office left to discharge in the position assigned to it by Hegel. Now, according to the view taken in the preceding pages, this judgment does not belong to the syllogistic process at all, but is the goal to which all syllogistic reasoning tends; constituting the foundation of intuitive or deductive reasoning, that reasoning which rests upon the conscious investigation of the constructions of thought. This conception is supported, (1) by Kant's arrangement of judgments,

¹ See p. 70.

(2) by Hegel's own doctrine of the relation of subjective and objective thought.

(1) According to Kant, the last judgment of the fourth group of judgments is the judgment of necessity. Now the ideal judgment, according to our conception of its nature, is a judgment of strict necessity; positively defining its subject-matter, and thus presenting it in the form suitable for intuition.

(2) According to Hegel, the process of subjective thought conducts to objective thought. But Hegel does not show *how* the passage from the one to the other is effected. He terminates the series of judgments with the disjunctive judgment, which he admits to belong to subjective thought. The function of this judgment is the classification of objects. Now by this operation, no doubt, the way is prepared for converting the objects of sense into objects of thought. But the conversion is not made. There is wanted a further operation, through which the transformation may be effected, before we can enter into the world of objective or deductive thought. And the ideal judgment, according to the view of its nature presented above, is just such an operation as is required for this purpose.

Thus the ideal judgment assumes its proper place as the foundation of deductive, intuitive, objective, or necessary thought. But this *necessity* is not a fetter placed upon thought by some power external to itself. It is only the perception of the consequences of limitations freely produced by thought through its own action.

So the *intuition* ascribed to the investigation of ideal judgments must not be confused with any operation of thought through which we can gain an intuitive knowledge of the universe. The objects dealt with in such judgments are objects produced by the free action of our own minds. All our knowledge of nature does indeed rest upon them. But it so rests, *not because* we can assert, *a priori*, that nature is so constituted as we may imagine, *but because*, through the study of our ideal judgments we become able to interpret the phenomena of nature *à posteriori*.

The ideal judgment is the *goal* of syllogistic reasoning, that is to say, of the process of induction; for, as is stated in the text, *syllogistic reasoning is essentially inductive*. The series of syllogisms begins with the perception of individuals. It proceeds to

determine the types to which these individuals belong. Thence it turns to the definition of these types, by enumerating their sub-types; a stage of thought represented by the disjunctive judgment, and constituting the present condition of the greater part of the sciences. At last we attain the power of defining types by enunciating their constitutive qualities. Here the *inductive or syllogistic process* ends. It has reached its goal. Then begins the *opposite process of deductive or intuitive* reasoning, which seeks to realize to conscious thought all that is included in the definition. In practice the two processes are indeed usually combined. *Deductive* reasoning is continually employed *tentatively*, in the course of induction, to test the accordance of an assumed principle with observed facts. *Inductive* reasoning continually enters *tentatively* into the course of deduction, from our inability to discern at once the consequences of our definitions. But the distinction between the two processes is one of great importance. Its neglect makes the right appreciation of logic impossible.

Syllogisms are usually presented as isolated fragments, torn from their natural connexion where each conclusion leads to one deeper than itself, till we reach the definition resting on the constitutive relations of the object defined. Now the syllogism thus isolated necessarily appears absurd; for its proof always involves an unproved assumption. And when we ask how to prove our premises, we are referred to a process of induction, of which the logicians can give no reasonable explanation, in order to lay for our syllogisms a foundation which makes the syllogisms themselves superfluous.

To remove the bewilderment produced by this one-sided use of the process of analysis, we require to perceive the synthetical connexion of the different syllogisms and their figures, which Hegel has the merit of having first pointed out: though his explanation of this connexion falls short of the completeness, necessary to give to the interesting operation of thought expressed in the syllogism its proper place in scientific consideration; a result principally due to his not having clearly seen the true character of the categorical syllogism.

A similar error has embarrassed logic since the days of its great Discoverer; who confuses reasoning *ἀπ' ἀρχῆς* or from defined

principles, with reasoning διὰ μέσων, i.e. syllogistic reasoning, which is really reasoning ἐκ' ἀρχῆν. Its origin may be traced to the fact that the categorical syllogism *looks* like a process of reasoning ἐκ' ἀρχῆς; because it assigns the individual to an assumed class, by means of some characteristic mark. But the process is essentially different, as will be seen from the following examples.

If we wish to ascertain whether a new species of animal belongs, say, to the horse family, we look for the characteristic marks distinguishing that family. We refer it to that family or not, *because* it has or has not these marks. If we wish to ascertain the relations of the angles at the base of an isosceles triangle, we study what is implied in the definition of a triangle when modified by the assumption that two of its sides are equal. Now in this case, as in the first, we may be obliged to reason syllogistically, διὰ μέσων; that is to employ some *means* of arriving at a clear understanding of the consequences of our conception. But the means stand in an essentially different relation to the end in the two cases. The conclusion as to the generic character of the animal *depends on the proof*, that is on the presence or absence of the particular characteristics. Take away the *means* of arriving at the conclusion, and the conclusion is gone. The conclusion as to the equality of the angles at the base of the triangle is *independent of the proof*. There may be more *means* than one of arriving at the conclusion, and the means selected may be ill-chosen. But this is indifferent to the result. The question is not *how do we ascertain* that the angles are equal? but *are* they equal? In the categorical conclusion the means are the *prop* on which the house rests. In the deductive they are a *scaffold*, taken away when the building is completed.

The distinction between the two operations of thought is as clear as it is important. Its importance must excuse the length of the observations by which we hope to have made it clear.

APPENDIX III.

The Logic of the Schools.

ORDINARY logic is founded on the supposition that the operations of thought are essentially acts of comparison. The process of thought, as the logicians describe it, is as follows:—

(1) The mind apprehends individual objects, as one, or as many; as related, or as not related to each other; red, blue, a house, a man, a sheep, a flock of sheep, etc.

(2) Having thus obtained materials for thought, we proceed to form judgments, by “comparing together in our minds two notions which are the objects of apprehension, and pronouncing that they agree or disagree with each other.”¹

(3) In this act of comparison our judgments may be either affirmative or negative, universal or particular. We may say, all A is B, or no A is B; some A is B, or some A is not B, etc. And in this operation our judgments are true or false, according to their nature and their application to subject-matters, necessary, impossible, or contingent.

(4) These judgments we proceed to compare with each other in the syllogism, by the following process. Since each judgment consists of two terms, say x and z, we take a middle term, y, capable of being compared with each; and compare each successively with it; whence we obtain the four well known figures, with all the ringing of changes belonging to them, according to the distribution of our “all’s” and our “no’s,” our “some is” and “some is not.”

- | | | | | | |
|---------------|---|------------|---|-------------|-------------------------|
| 1. All y is x | : | all z is y | ∴ | all z is x | b A r b A r A |
| 2. No x is y | : | all z is y | ∴ | no z is x | c E s A r E |
| 3. All y is x | : | all y is z | ∴ | some z is x | d A r A p t I |
| 4. All x is y | : | all y is z | ∴ | some z is x | brAmAntIp. ² |

¹ Whateley, *Logic*, ii. § 55.

² See note, p. 253, for the variations in these figures.

Logic, according to this view of its function, is only a system of rules for enabling the operation of comparing judgments to be performed with formal correctness; the truth or falsehood of the results attained being wholly strange to it.

This formal character has been the ground of many attacks made upon logic, with very little reason. For if there is a science of thought, distinct from the science of the things thought about, this science must necessarily be *formal*, *i.e.*, a science of the *forms of thought*; and, if more be demanded of it than to give a reasonable explanation of these forms, the demand is unreasonable. The true ground of complaint against the common logic is, that it does *not* give such an explanation. It professes to be a science of the process of thought; yet all that it does is, to furnish a set of rules for making comparisons which, so far as appears from the account given by the logicians, need not be made at all. Why should we introduce a *y* between the *x* and *z* of our judgments, in order to compare *z* with *x*? If *x* can be compared with *y*, and *y* with *z*, why cannot *x* and *y* be compared directly? To this question the logicians give no answer; for the best of reasons, namely, that from their position none is possible.

They have busied themselves with one half only of the process of thought, overlooking the other half where the answer to this question is to be found. Their rules concern only the operation of analysis. Of the important operations of construction, on which that analysis rests, they give no intimation. But in them lies the explanation both of the simple comparisons made by our judgments, and of the more complicated system of comparisons carried on by the syllogism. That we do take the notions comprised in our judgments to pieces, and compare them with the conceptions of which they respectively form parts, is undeniable. We judge a house to be red, or grass to be green. If this judgment is called into question, we dissect our conceptions of the house or grass, and, separating the color of these objects from all the other elements composing the thought of them, we examine it, to see whether it *agrees* with our conception of the color called by us red or green. When the examination is ended the assertion or denial follows as of course. But to make the analysis possible a synthesis must have preceded it. If we had

not first brought the thought of the house or the grass, and the particular color, together in our minds, we never could have judged whether the color did or did not belong to the object conceived.¹ Language bears witness to this preliminary action of thought. The judgments of our propositions are uniformly made by the verb "to be," and not by the verb "to be like or to agree." We do not say the house *agrees* with red, or the grass *is like* green; but, the house *is* red, the grass *is* green; expressions implying that the red or the green form part of our conception of the house or grass; that our judgment is the result of an examination resting on a previous act of constructive thought.²

So with the syllogism. Its function is to bring to light the three factors involved in every conception and implied in every judgment,—the general, the particular, and the individual. For, as our judgments, arising from the dissection of our conceptions into their parts, deal with these parts singly and therefore con-

¹ In the act of comparison we generalize the "red" or "green," in our thought, into circles of variously colored tints, and ask is the color of the house or grass *contained* in these circles or not?

² It is an interesting fact, that the primitive roots of language are found always to express some thought capable of giving unity to the diversity of observed objects, some general thought. "Antrum," for instance, has been traced to the Sanskrit *antar*, "within," caverna to *sku* or *ku*, "to cover," which appears again in *scutos*, *cutis*, *kollos*, *cælum*, *cul*. River is derived from *ru* or *rhu*, "to run," a root which we find among the Germans as the proper name of the Rhine. The Ganges (*Gunga*) literally means the Go-go. The Indus (*Sindhu*) means "the irrigator," a name derived from the verb "to sprinkle." The Sanskrit for sun signifies "the begetter;" for moon, "the measurer;" for cows and sheep, "the feeders." See Max Müller, "Lectures on the Science of Language," 356-368. From this circumstance comes, we apprehend, M. Max Müller's objection to what he calls the "bow-wow" and the "pooh-pooh" theories of speech, and his notion that the constituent elements of language are "*phonetic types*, produced by a power inherent in human nature." A writer in Macmillan's Magazine for Nov., 1861, p. 56, criticizes this theory as unintelligible, and adduces various reasons for the opinion that the primitive roots of language were imitations of natural sounds, or sounds naturally responding to certain states of feeling in man. It seems to us that this is highly probable. But these *sounds* were *signs* to the man who used them of a *great deal more than they expressed*. That a cat should be called "purr," and a cow "moo," would be very natural. But the man who gave these names to the respective animals would exercise, in so doing, the "faculty of giving more articulate expression to the rational conceptions of his own mind," though the sounds chosen by him to effect this object were borrowed from the interjectional cries of the animals. To him they had passed from interjections into symbols of conceptions.

sist of two terms only, one of these factors is necessarily latent and assumed. The syllogism is the *reflection* of thought upon itself, to ascertain whether this assumption is well made, by dragging the latent element to light. We say Caius is mortal, and ask ourselves why? How do we know that this individual can be classed under the genus of mortal beings? The answer is given by passing in review his peculiarities, and satisfying ourselves that they designate him as one of a particular type of beings of whom we know mortality to be a characteristic. Therefore the syllogism necessarily involves a comparison of three terms. But that comparison is so far from constituting the operation of thought, that it is only a consequence of the original act of conception, whereby we constitute the individual out of the general by quantitative determinations of the particular. The logicians, not appreciating the reason of this comparison, and setting out by considering, not the realities of thought, but the separate judgments into which they may be dissected, have resolved the theory of the syllogism into that of the process by which sentences may be compared, and have thus formed their scheme of logical figures.

And yet they admit that, of the four legs supplied by them to logic, each, in their complete scheme, symmetrically furnished with six toes, the last has been afflicted with natural paralysis from its birth; while of the toes, two in the first and second figure, and one in the third, are useless. So that, by their own showing, their scheme is not a natural product of thought, but an artificial arrangement imposed upon it.¹

A juster appreciation of the real nature of the syllogism would have led the logicians to a classification resting upon intelligible principles. They would have seen, as the illustrious Founder of

¹ Dr. Whately allows the fourth figure to be an awkward parody of the first, though he cites an instance of its use by Cicero in the following argument:—"Whatever is expedient is natural: whatever is natural is not hurtful to society: therefore whatever is hurtful to society is not expedient." The following examples cited from Aldrich illustrate the clumsy stupidity attending its use:—"All diamonds consist of carbon: all carbon is combustible: therefore some combustible substances are diamonds." "All planets are opaque bodies; no opaque bodies transmit light, therefore no bodies transmitting light are planets." Sir W. Hamilton undertakes scientifically to abolish the fourth figure, and to show that only three syllogistic figures are possible. Discussions, 612.

logical science apparently saw, that the comparison of judgments can be effected only in *three* ways: (1) by comparing the object of the judgment as a whole, with its parts; (2) by comparing the different parts of that object among themselves; (3) by comparing similar parts of different objects, so as to effect a comparison of these objects;—and they would have classified accordingly the modes of speech by which these comparisons are spontaneously made. Thus they would have reduced their scheme to three figures, standing in a natural connexion with the figures deduced in Chapter VI.

(1) We have seen that, in the first of these figures, the individual is thought of as part of a generality into which it is bound up by the particular. Therefore in this figure we compare an object thought of as part of a whole, with that whole. To effect the comparison we take some characteristic belonging to that whole, and make it the subject of our first judgment, and the predicate of our second; taking the whole for the predicate of our first judgment; and for the subject of our second the part to be compared. For, as will be shortly shown, in the common categorical judgment, the subject is always thought of as *included* in the predicate. Thus we obtain the first logical figure:

All y is x (G) : all z is y (P) \therefore all z is x (I).

To quote an example cited by Dr. Whately from Aristotle:

*He who possesses prudence (the characteristic) possesses all virtue
—he who possesses one virtue (the part compared) must possess
prudence—therefore he who possesses one virtue possesses all.*

The example is indeed perplexing, from the paradoxical nature of the proposition: we naturally think of that which possesses as including that which is possessed; while here, prudence (*i.e.* self-government) is treated as included in all virtues, because it is the essence of all; but it equally illustrates the character of the figure.

(2) In the second figure¹ we attempt to discover a unity between different parts comprised in the same individual, by treating one as general, and the other as particular. That is to

¹ The third of the common arrangement.

say, we compare different characteristics of the same object, through their connexion with that object; and for that purpose make of this individual the subject of two judgments of which the two characteristics are the predicates. For each part of each individual is conceived as one phase of a circle of many phases: so that the individual is thought of as included in its own parts; and of these, in the case supposed, one is assumed to be included in the other. Thus we obtain the third of the common logical figures:

All y is x (G) : all y is z (I) \therefore some z is x (P).

To quote, again from Dr. Whately, an example taken from part of Adam Smith's argument against Hutcheson:

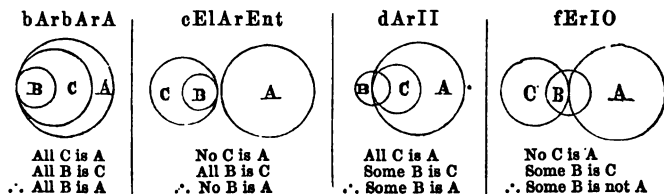
Prudence has for its object the benefit of the individual—but prudence is a virtue—so there is a virtue having for its object the benefit of the individual.

(3) In the third figure we endeavour to establish a unity between different objects by means of the same characteristic, and are thus driven to treat this characteristic, first positively as the particular, and then negatively as the general. In the process of comparison it is obvious that the part thus dealt with must form the predicate of each judgment and the objects compared form their subjects: since we seek to determine, as to each in succession, whether it is included in this part or not. The result is the second logical figure:

All x is y (P) : no z is y (i.e. all z is not- y) (G) \therefore no z is x (I).¹

¹ The following diagrams may help to illustrate the relations of the moods in the three natural figures, taken in their natural order:—

I. A=the whole. B=the part to be tested. C=the characteristic used as test.



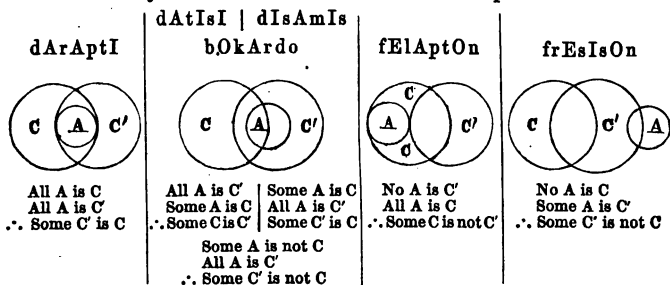
Dr. Whately illustrates it by Cicero's argument against the Epicureans :

All true philosophers reckon virtue a good in itself—the Epicureans do not reckon virtue a good in itself—therefore the Epicureans are not true philosophers.

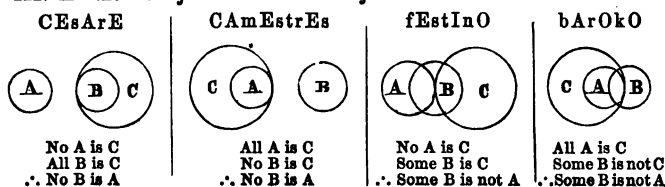
The light cast by the study of the operations of thought upon the forms of language, whence the figures and moods of ordinary logic are derived, may be applied to illustrate a defect in its scheme, pointed out by the sagacity of Sir William Hamilton, namely, the absence of the distributive words "all" or "some," in the predicates of its formal judgments. If all judgments are reduced to the form A is B, and this form is explained to mean A agrees with B, it would certainly be reasonable that the logical symbol should indicate *how far* A and B agree; whether all A agrees with all B, or with some B only; or some A with some B only, or with all. Accordingly Sir W. Hamilton proposes to distinguish the recognised forms,

All A is B, and } into { I. All A is all B; II. All A is some B.
Some A is B } { I. Some A is all B; II. Some A is some B.

II. A = the object. C C' = the two characteristics compared.



III. A = the 1st object. B = the 2nd object. C = the characteristic.



But the suggestion, acute and ingenious as it is, would darken the subject intended to be elucidated, by systematically building up that false theory of the function of judgment, which resolves it into the formation of comparisons, without regard to the correcting witness of language that the scheme has some radical defect. To say "all equiangular triangles are all equilateral triangles," is to do violence to speech. And the sentence, "all cats are some vertebrate animals," would be a very unnatural way of stating that the possession of vertebræ is not confined to cats. In truth, thought insists on combining its subjects and predicates into unities of conception; and to do this, must *include one side of every judgment in the other*. The side included may be *either* subject *or* predicate; but it cannot be *both at once*. Such sentences as, "all equilateral triangles are all equiangular triangles," "all cats are some carnivorous animals," are monstrosities, creatures with double heads and no legs, or double legs and no heads. To introduce logical schemes involving them would be to mend logic by confusing thought.

Yet the common scheme *is* imperfect. There *are* two great classes of judgments, respectively represented by the categorical and the disjunctive syllogisms: namely, I. that in which the subject leans upon the predicate; II. that in which the predicate leans upon the subject. To the first class belong our ordinary judgments, where we deal with conceptions whose parts are thought of as accidentally combined. "This rose is red," "this figure has three sides," etc. Here the form of our judgment leaves us at liberty to think of the negative equally with the affirmative: to think of a rose having another color, or of a figure having more or fewer sides than three. At the opposite extremity of this class of judgments comes the apodeictic judgment. "This triangle is equilateral, therefore it is equiangular," etc. Here our thought has bound itself. The predicate is involved in the subject, and therefore necessarily belongs to all cases of it; yet the necessity is not complete. "Equiangular" is connected with "equilateral" *inseparably*, but not *exclusively*. Therefore we cannot reverse our judgment, and assert that, "because all equilateral triangles are equiangular, all equiangular triangles must be equilateral." To make such a reversal possible, our judgments must assume the *second* form, as in the following cases:

Metals are gold, silver, etc.—therefore gold is a metal.

A triangle is that plane rectilinear figure which has three sides—therefore any plane rectilinear figure which has three sides is triangular.

Now speech, being the spontaneous expression of thought, faithfully reflects these two great divisions of our judgments, by associating the words “all” or “some” with that side of them, subject or predicate, which is thought of as included in the other. We can say “all roses are colored,” “some gold is brittle,” “some bridges are strong,” “all men are mortal,” “all equilateral triangles are equiangular [figures],” because in each of these judgments the subject is thought of as included wholly, or partially, in the predicate. But we cannot say, “all metals are gold, silver, tin, etc.” “all triangles are those plane rectilinear figures which have three sides.” Here the instinct of language assigns “all” or “some” to the other side. Thus we can say, “triangles are all those plane rectilinear figures, etc.,” “vertebrate animals are all walking, all singing, some flying, some creeping, etc., creatures,” for here the predicate is thought of as included in the subject.

Sir W. Hamilton, then, is right in maintaining that, in our judgments, we do think both of subject and predicate as “all” or “some.” His error lies in not seeing that this thought is connected with a reference to those notions of necessity and contingency, which he sought to banish from logic. While the error of the ordinary logicians is, that they have excluded from their classification the class of judgments which express by their form a reference to necessary thought, and are reduced to smuggle in this reference among judgments to which it does not belong.¹

¹ There is a subtlety about these forms of judgment which may easily lead to mistakes, if it be not noticed. If the definition of a triangle given above is reversed, and stands “that rectilineal plane figure which has three sides is a triangle,” the word “all” will revert to the subject. We should say, “all those rectilinear,” etc., not the converse. The reason appears to be, that we instinctively look to the predicates of our judgments, in order to learn their kinds. If the predicate is a simple quality, we consider the judgment to be one of perception. If it simply states a relation, we consider the judgment to be one of induction. If it defines that relation, we conclude that the judgment is one of necessity, and we apply our “alls” and our “somes” accordingly. Now, in the judgment, “that rectilineal plane figure which has three sides is a triangle,” the predicate only *states* the relation, but does not *define*

As an art the school logic, notwithstanding the many deficiencies of its explanations, is not without its use. We learn to walk by instinct, but most of us would be the better for a few lessons from the drill sergeant. Its use in this respect is illustrated by Dr. Whately in his excellent chapter on fallacies, where he follows up the position that the rules of his favorite science are of no avail in enabling us to gain clear ideas, by 72 pages filled with skilful exposures of various false conclusions, effected by reducing their premises to precise logical forms. From the nature of our judgments, so much of every argument is usually taken for granted, that the habit of completing the links of any chain of thought is a useful exercise, by accustom-

it. Therefore we treat the judgment as one of induction. For aught that appears from it, triangles might include other kinds of figures.

Mr. Davies, in commenting upon this doctrine of Sir W. Hamilton, justifies the position that the predicate is sometimes distributed, by citing the proposition, "a necessary truth is that the negation of which is inconceivable." He observes that, since *some* things of which the negative has seemed to men inconceivable, have nevertheless proved to be true, *e.g.*, the existence of antipodes, the proposition can mean only, *some* things, the negation of which is inconceivable are necessary truths (A B C of Thought, 66). The argument curiously illustrates the instinctive action of thought; for Mr. Davies has, apparently, no perception of the natural classification of our judgments stated by us above, and yet has hit on a judgment belonging to that class where the predicate is thought of as included in the subject. In regard to the "necessity," however, he confuses a necessity of thought, that is, the circumstance that certain consequences follow from the data assumed by us in any particular case, with a necessity of observed relations. If we construct an earth in thought, with an upper and an under side, and attribute the fact of our not falling off from it to the circumstance of our living on the upper side, it follows, as a necessity of thought, that there can be no antipodes; but it does not follow that the earth so constructed by our thought answers to the real earth the object of our senses.

In his remarks upon the use of "all" and "some" (p. 71), Mr. Davies falls into an error similar to that of Sir W. Hamilton, by attempting to produce logical forms which shall express the fact that "wholes" are continually conceived as parts of other wholes. He adduces the sentence, "the men who wear Lincoln green are some certain riflemen, Jones is one of these riflemen \therefore Jones wears Lincoln green," as an instance of a syllogism in the second logical figure, with affirmative premises; and the sentence, "no poets are some certain," viz., "prosaic men," as an instance of a particular negative proposition admitting of simple conversion. But the so-called syllogism is only a clumsy expansion of the simple proposition, "Jones is a rifleman who wears Lincoln green;" and the proposition as to poets a travesty of the statement, "no poets are prosaic men." The "men who wear Lincoln green" are indeed included in the conception of "riflemen," and "prosaic men," in that of "men;" but in the cases adduced, we think of them as wholes, and not as parts; and to drag in the thought that these wholes are also parts of larger wholes, is to produce, not clearness, but confusion.

ing the intellect to detect unproved premises. But the complaint of those, who have been dissatisfied that the study of the principles of reasoning should yield results so barren of scientific interest, as are the ordinary logical doctrines, is well founded. The laws of thought are not to be confused with the classification of the forms crystallized from its operations; and the writers who require logic to teach them the "right use of reason," are nearer the truth in their instinctive demand than the clever logician who laughs at them.

They have divined, though they did not distinctly discern, that *Logic is the process by means of which our thoughts pass from the consciousness of the sensible to the consciousness of the ideal.*

APPENDIX IV.

The Principle of Beauty.

FROM the considerations adduced in the preceding pages, it seems possible to arrive at a conception as to this much vexed question, which, if it will not remove every difficulty, at least goes a long way towards a satisfactory solution. *Beauty* we apprehend to be *the principle of unity in variety made sensible to the eye*, as *music* is the same principle made sensible to the ear. From this conception the relation to the beautiful of the picturesque, the fantastic, and the luxuriant, on the one hand; and on the other, that of the grand, the monotonous, and the sublime, is immediately discernible. In the *beautiful*, unity and variety are evenly balanced. In the *picturesque*, variety predominates, the sense of unity being still preserved.¹ In the *fantastic*, this sense is lost, and that of variety remains unbalanced. On the opposite side, if the sense of unity predominates, while that of variety is preserved, we have *the grand or majestic*. If the sense of variety is lost, and that of unity remains unbalanced, there results the *monotonous*. But if either variety or unity is associated with the feeling of infinity, we have, on the one side the sense of *richness* or *luxuriance*, on the other that of *sublimity*; which again degenerate into *bewilderment* or *terror*, if our thought loses its footing, and passes into the subjective stage, where it lies prostrate beneath the objects cast upon it (see chap vii.).

How deep an insight the principle here enunciated gives us into the theory of the beautiful those who choose may test, by applying it to solve the questions asked by Mr. Ruskin in his "Two Paths" as to the principles of combination adopted by an

¹ Mr. Ruskin, after seeking the elements of the picturesque in various mental associations, concludes, of such objects, "their merely outward delightfulness—that which makes them pleasant in painting, or, in the literal sense, picturesque—is their actual variety of color and form."—*Mod. Paint.* iv. 6.

ingenious friend, in constructing, out of certain data furnished by Mr. Ruskin, a design for a "sporting handkerchief." At the same time we may perceive why it is so impossible, as Mr. Ruskin truly contends that it is, to give any rules for composing the beautiful. A picture or a statue, like every other work of human energy, is an act of constructive thought, which cannot be tied to any particular mode of producing unity or variety, but may produce them in an infinity of ways, so that the way adopted in each particular case be consistent with itself. Little, therefore, can be done for the artist, beyond helping him to acquire skill of hand, except by buoying out a few shoals, and opening his eyes to study for himself the endless store of materials for his constructions, offered him in the ever fresh treasury of nature.

Another illustration of the explanatory power of this conception may be taken from that natural delight in the *clear* or *crystalline*, noticed by Wordsworth.¹ Owing to the gradual extinction of the light reflected from the particles of such a substance, it must offer the most complete gradation of tints, the most delicate differences blended into a perfect unity. To the same cause is due, we apprehend, the pleasure of the eye in the transparent freshness of *water-color drawings*, when the washes are not muddled. A good artist is too well aware of the infinite variety of natural coloring, to attempt its reproduction by tints of uniform strength. He is certain to gradate them. Nay, the very nature of the material used almost compels him to do so. Then, since water-colors are illuminated by the light reflected through them from the surface on which they are laid, a gradated wash of these materials must produce the same kind of varied unity as is produced by the light reflected from different depths in a fluid or crystalline mass.

¹ Why stand we gazing on the sparkling brine,
 With wonder smit by its transparency,
 And all enraptured by its purity?
 Because the unstained, the pure, the crystalline,
 Have ever in them something of benign;
 Whether in gem, in water, or in sky,
 Or sleeping infant's brow, or wakeful eye
 Of a young maiden, only not Divine.*

* Sonnets during a Tour in Scotland, xv., vol. v. 223.

ADDITIONS AND CORRECTIONS.

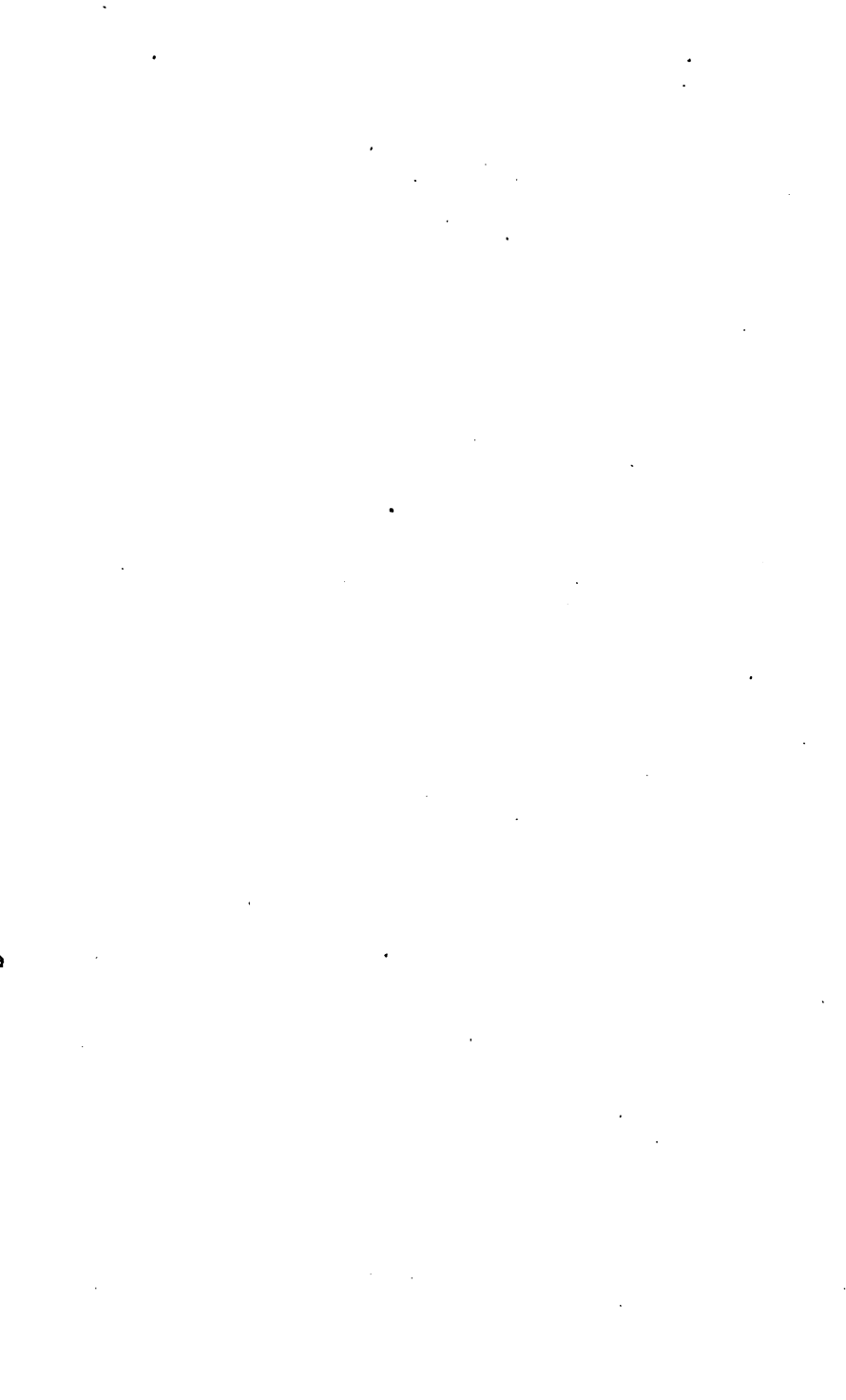
Page 34, note 1. Since this note was in type we have read Dr. Zeller's excellent account of Zeno's arguments to prove the unity of being by showing that to think of its plurality involves absurdities (*Philosophie des Griechen*, i. 424-434). We gather from it that the argument drawn from the "flying arrow" really turned upon the position, that its motion is thought of as present; yet, since present time is infinitely short, any motion during it is inconceivable. The answer to the objection thus stated is, that the *present* is thought of as a *moving point* produced by the union, ever renewed in thought, of the *past* with the *future*; a point whose speed varies in every case with the rapidity of the succession thought of, though we, for convenience of comparison, reduce all these divers speeds to a common measure. Of his other arguments, two are noticed in the notes to pp. 40 and 127, as difficulties reproduced in modern times. All except one, where the *interval* left by two bodies moving in opposite directions is confused with the *space* traversed by each, rest upon that infinite divisibility belonging to the thoughts of space and time, so bewildering till traced to its source in our own mental action.

- Page 35, line 14, for "mny" read "may."
 " 53, " 5, omit "that."
 " 59, " 10, for ";" read " ,"
 " 70, In first example, transpose the two first sentences, the major and minor premiss.
 " 82, line 10, for "wills" read "will."
 " 92, note 2, line 5, for "anti" read "ante."
 " 119, " 1, " 4, for "sucht" read "sucht."
 " 119, " 1, " 5, for "fliehen" read "fliehen."
 " 119, " 1, " 6, for "reisen" read "reisen."
 " 120, line 14, for "fo" read "so."
 " 170, " 18, for "existence" read "co-existence."
 " 171, " 17, for "both points" read "the last point."
 " 198, " 8, for "organic" read "inorganic."
 " 201, " 14, for " " read " ;"
 " 204, " 26, after "hope" add "In like manner the variety perceived in man's conceptions of the Divine nature ceases to embarrass us; for it is only what must be expected from the constructive freedom of thought, when it has to deal with a subject matter complicated by such manifold considerations."

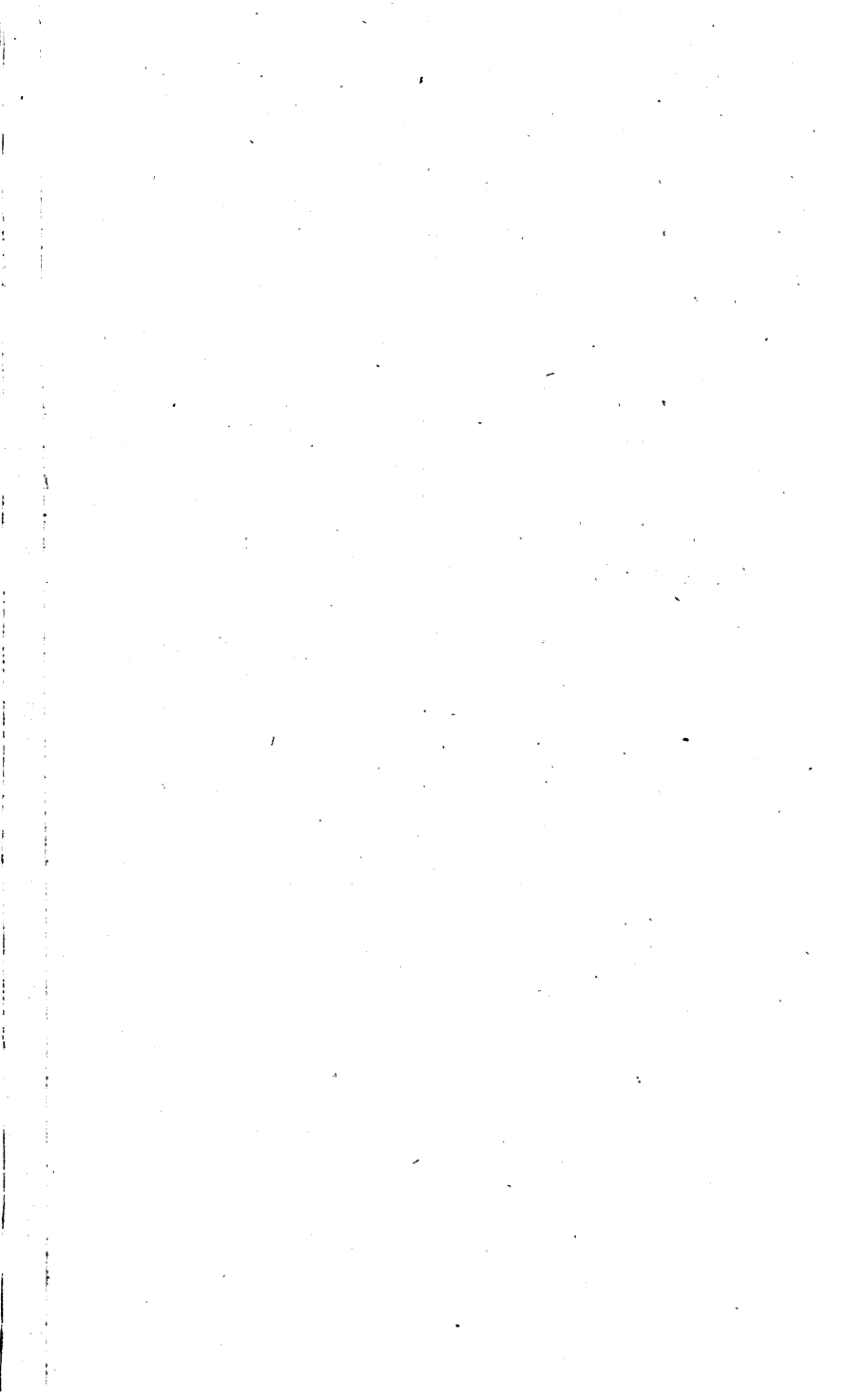
THE END.

ack

A. S.







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